IRON & COAL

THE IRON AND COAL TRADES' REVIEW

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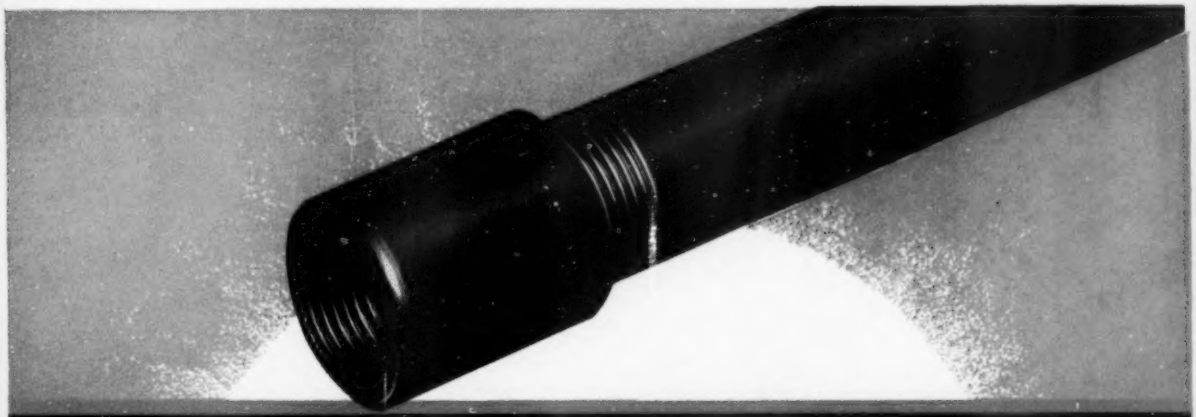


FOR MINING PURPOSES

there is nothing

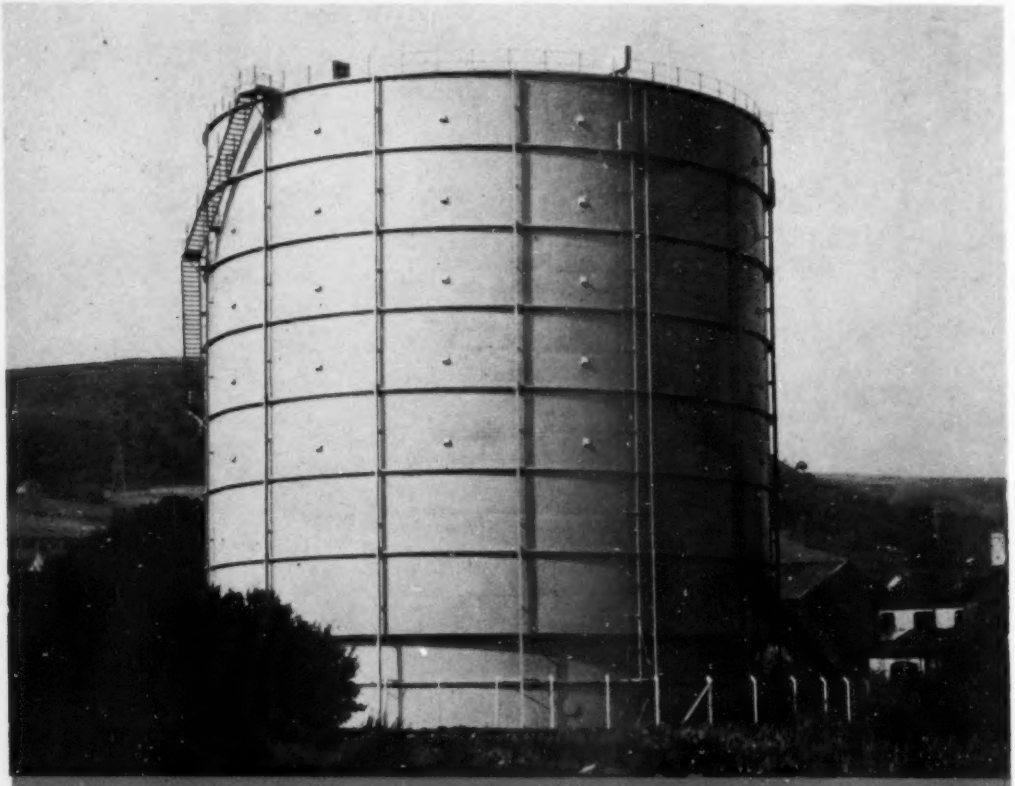
stronger or cheaper than

steel tubes

PRODUCT OF

S&L

STEWARTS AND LLOYDS LIMITED · GLASGOW · BIRMINGHAM · LONDON



A 500,000 cu. ft. Wiggins dry seal gasholder.

ECONOMIC STORAGE
IN THE WIGGINS DRY SEAL GASHOLDER

LOW OPERATING COSTS SMALL MAINTENANCE COSTS

Over 20 years experience has been gained in the design and supply of over 500 Wiggins gasholders throughout the world with capacities ranging from 50 cu. ft. to 5,000,000 cu. ft.

POWER-GAS | DAVY-ASHMORE GROUP

THE POWER-GAS CORPORATION LIMITED · STOCKTON-ON-TEES

LONDON · SHEFFIELD · GLASGOW · MIDDLESBROUGH · HULL · PARIS · MONTREAL · MELBOURNE · SYDNEY · JOHANNESBURG · SALISBURY · CALCUTTA · BOMBAY

468

NOW

IS THE TIME

FOR ALL

GOOD IDLERS

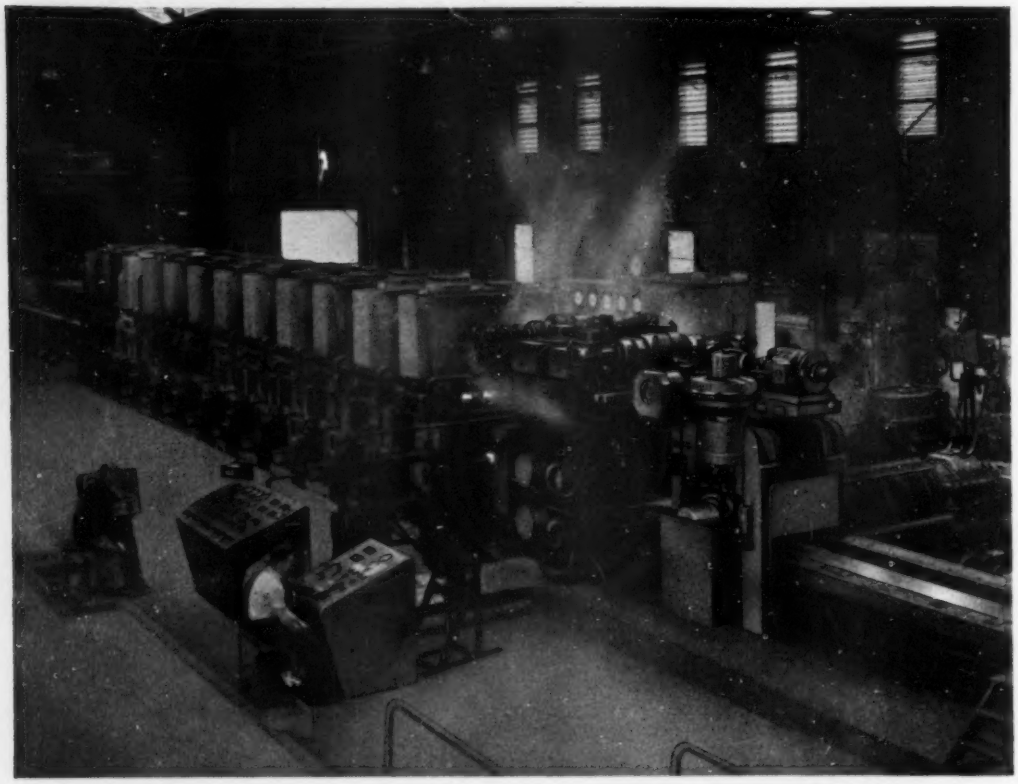
TO COME

TO THE

AID OF THE BELTING

M&C Idlers take good care of the conveyor belting that runs on them. They are smooth and free from sharp edges. And, because they spin at a touch with hardly any friction, they reduce both belt tension and wear on the driving surface. The more easily idlers turn, the more economical can a conveyor be and the less upkeep it needs. And no Idlers turn more easily than those made by M&C.

MAVOR & COULSON LTD Bridgeton Glasgow S.E · Olive Grove Rd. Sheffield 2
4 Mount Stuart Sq.·Cardiff · 1 Eldon Sq. Newcastle-on-Tyne 1



SENDZIMIR PLANETARY HOT ROLLING MILL

BUILT BY **ROBERTSON**

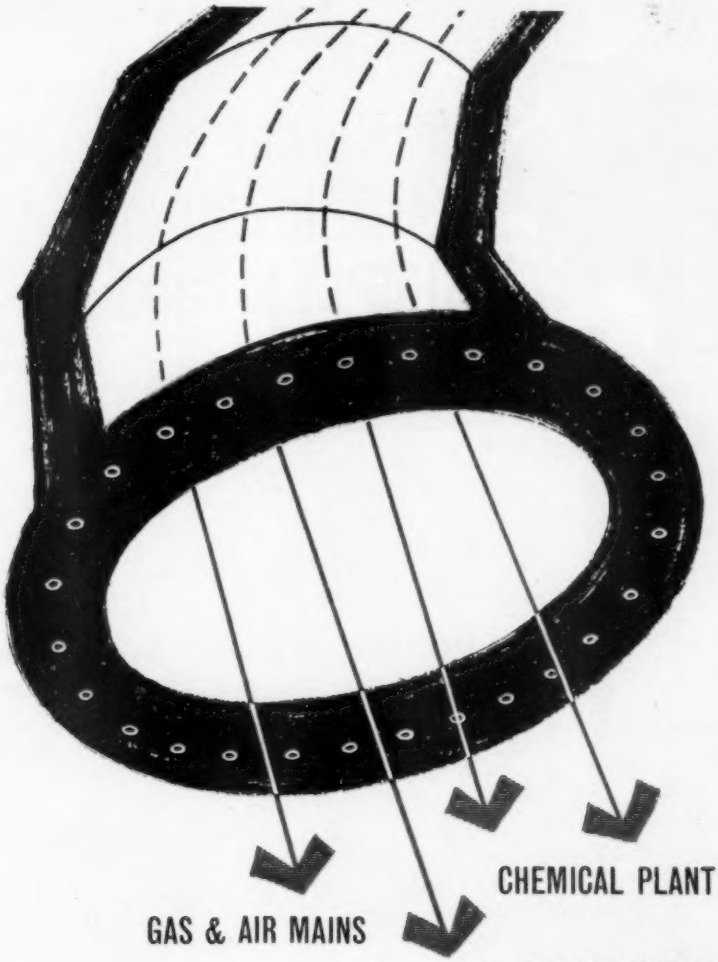
FOR MESSRS. J. J. HABERSHON & SONS LTD., ROTHERHAM, BY WHOSE COURTESY THIS PHOTOGRAPH APPEARS.

This mill is designed to produce hot rolled strip up to 15 in. wide and as thin as .048 from slabs 1¼ in. thick in mild, high carbon and stainless steels. The mill consists essentially of feed rolls, planetary roll assembly and a final two-high planishing mill followed by coiling equipment. Nominal output is 10 tons per hour which has already been considerably exceeded. Surface finish is fully up to the standard required for subsequent cold rolling. This is the second Planetary Mill in Great Britain, both of which have been *BUILT BY ROBERTSON*

W. H. A. ROBERTSON & CO. LTD. BEDFORD, ENGLAND

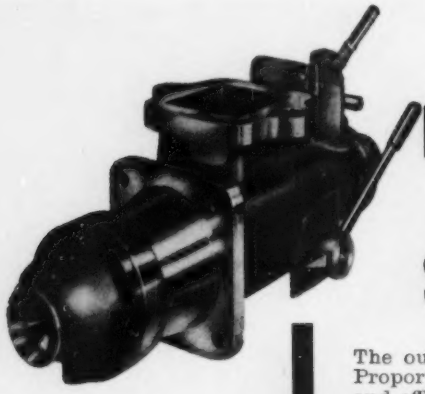
LICENSEES FOR THE BUILDING OF SENDZIMIR COLD REDUCTION MILLS AND PLANETARY HOT MILLS, AND HALLDEN FLYING SHEARS.

WT. 316R



Lobster back pipework specials
and other steel fabrications
are made wonderfully well
to any specification.

CROMPTON & HARRISON LTD.
incorporating W. T. SEYMOUR (STOCKTON) LTD.
part of the FORSTER group
SEAHAM, CO. DURHAM. Telephone 2321



Here is one Oil Burner that brings efficiency SIMPLY to hand

The Burner shown has a maximum output of 12 gallons per hour and requires atomising air at 20" (51 cm) w.g. to 30" (76 cm) w.g. with oil at not less than 5 lbs per sq. in. (0.35 kgs per sq. cm) or equivalent head.

The outcome of 80 years' experience the Wallsend Self-Proportioning Low Air Pressure Oil Burner brings new ease and efficiency of control to oil burning. The single lever at the side automatically proportions oil and air quantities in the correct ratio and whatever the type of fuel.
It has, too, a turn down range of approximately 5 : 1 which can be achieved with a stable flame, efficient combustion and a high CO_2 content. Made with the well known Wallsend features of robustness, long service with little maintenance, and flexibility this outstanding burner leads the way, as well, to automatic or remote control of all single and multi-burner installations . . .

THE WALLSEND SELF-PROPORTIONING LOW AIR PRESSURE BURNER

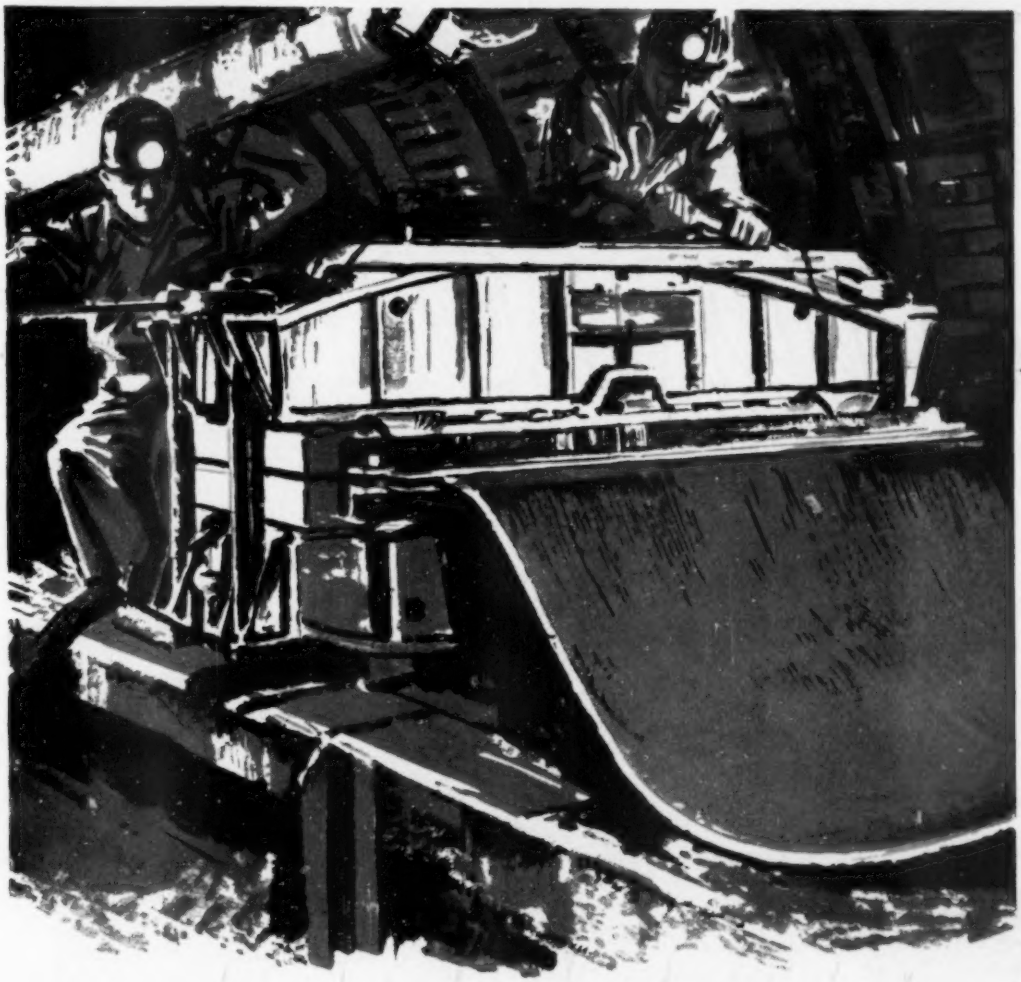
For more efficient OIL BURNING consult

THE WALLSEND SLIPWAY & ENGINEERING COMPANY LIMITED

WALLSEND-ON-TYNE

In association with **HUBBARD COMBUSTION LIMITED** Kingston on Thames

WSE 1/8



CUT CONVEYING COSTS

SPLICED JOINTS FOR STRENGTH AND SMOOTH RUNNING

Stoppage of production to replace worn or damaged metal fasteners is eliminated when a belt is jointed by splicing. Such a belt is virtually homogeneous along its entire length and this gives longer and better service. Uninterrupted belt life and smoother running follow from 'on-site' vulcanising carried out by the Silvertown Mobile Splicing Service . . . one of the advantages enjoyed by users of Silvertown conveyor belting. Reduce your 'cost to produce' by specifying . . .

Silvertown

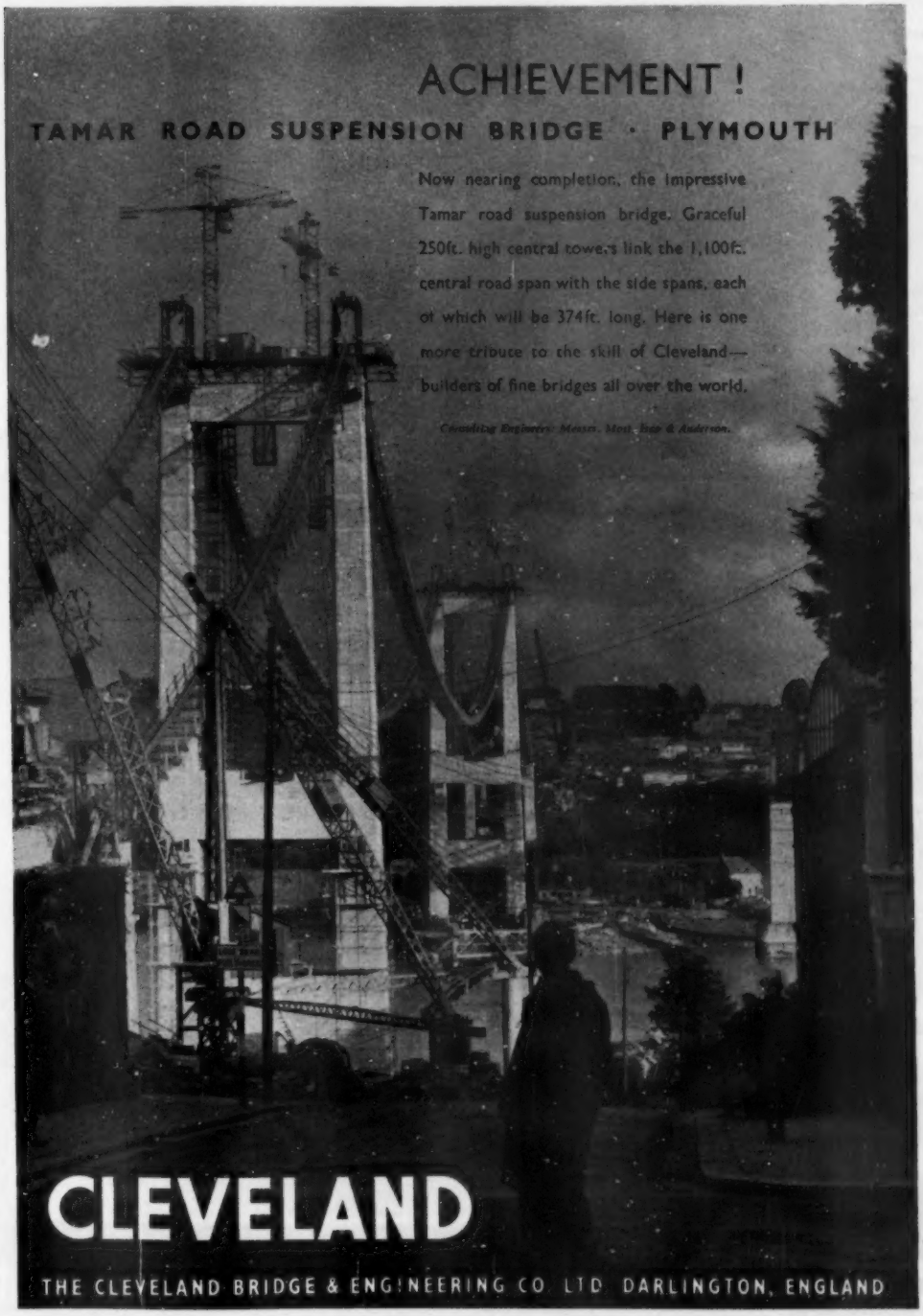
SILVERTOWN RUBBER CO. LTD, HERGA HOUSE, VINCENT SQUARE, LONDON S.W.1
1/3637

THE BONSER HYDRAULIC RAM

A HYDRAULIC RAM built
to give reliable service under the
worst pit conditions. Material and design
specifications of the highest standard.
Total Thrust 3·15 Tons at 1000 PSI
Piston 2″ Diameter
Tube 3″ inside, wall thickness $\frac{1}{4}$″

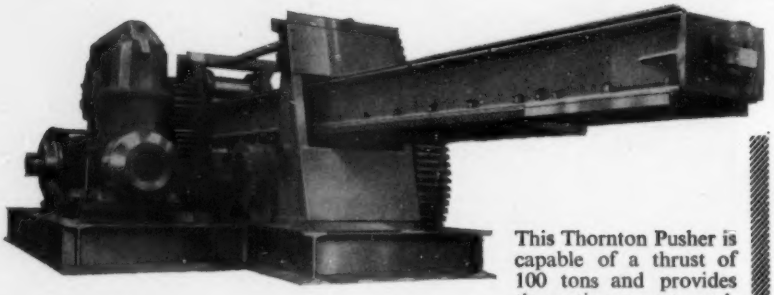
BONSER TRISTRAM LTD

WATNALL ROAD HUCKNALL NOTTS. Tel: Hucknall 2261


ACHIEVEMENT !
TAMAR ROAD SUSPENSION BRIDGE · PLYMOUTH
Now nearing completion, the impressive Tamar road suspension bridge. Graceful 250ft. high central towers link the 1,100ft. central road span with the side spans, each of which will be 374ft. long. Here is one more tribute to the skill of Cleveland—builders of fine bridges all over the world.
Consulting Engineers: Messrs. Mott, Hay & Anderson.
CLEVELAND
THE CLEVELAND BRIDGE & ENGINEERING CO LTD DARLINGTON, ENGLAND

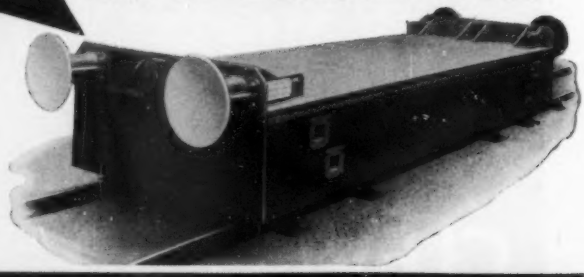
THORNTON

ANOTHER 100 TON FURNACE PUSHER...



This Thornton Pusher is capable of a thrust of 100 tons and provides the motive power to push a continuous train of ingot or slab furnace cars through the furnace.

60 TON CAPACITY CAR FOR SHOT BLASTING...



We designed this car with all-round rubber screening to provide added protection when bearing heavy castings for cleaning in a shot-blast chamber.

Specify THORNTON Equipment

Built to our own designs or to customers specification

B. THORNTON LTD. TURNBRIDGE, HUDDERSFIELD. Tel 7541

Burtonwood
Oil Seals
for Industry

For maximum sealing with minimum torque; For heavy duty and light duty applications—specify Burtonwood Oil Seals.

Available in diameters from a ¼inch to 4½feet.

Fitted as standard equipment by many leading names in the motor industry and in the larger field of general engineering, Burtonwood Oil Seals will be found in a wide variety of applications ranging from cars to cranes, or washing machines to rolling mills, giving dependable and efficient service in all parts of the world.

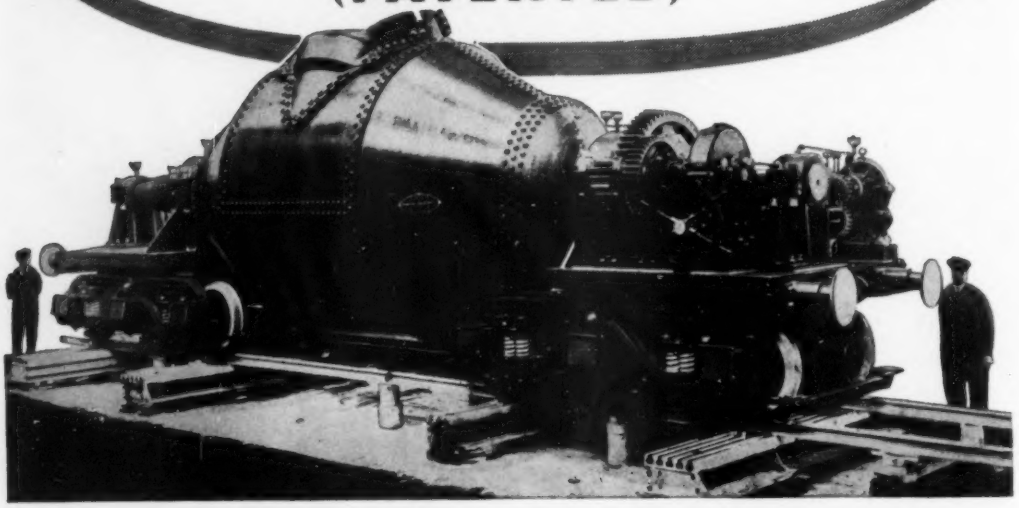
Please write for our Industrial Oil Seal and Rubber Moulding Catalogue Ref. 69/IND/SD.

BURTONWOOD ENGINEERING COMPANY LTD.
BURTONWOOD . WARRINGTON . LANCASHIRE
TELEPHONE: NEWTON-LE-WILLOWS 2641 (10 LINES)

MAKERS OF THE LARGEST RANGE OF OIL SEALS IN THE WORLD

1A

Hot Metal Mixer Cars
(PATENTED)



MORE THAN 300 MIXER CARS SOLD

CAPACITIES FROM 75 TO 160 TONS
OF HOT METAL

Other Specialities Include:

MORGAN GAS MACHINES
SOAKING PITS (ISLEY CONTROLLED)
MILL FURNACES
TYPHOON ROTARY FLAME GAS BURNERS
NASSHEUER CONTINUOUS BRIGHT ANNEALING FURNACES
(Sole Licensees).

THE INTERNATIONAL CONSTRUCTION CO., LTD.
SUCCESSORS TO — JULIAN KENNEDY, SAHLIN & CO., LTD.
56, KINGSWAY, LONDON, W.C.2.

Modern carving in the church of St. James the Great, Hindlip, of pigs feeding on acorns. Photograph by Ruth Meyler & F. C. Sillar

50 MILLION PIGS GO TO MARKET!

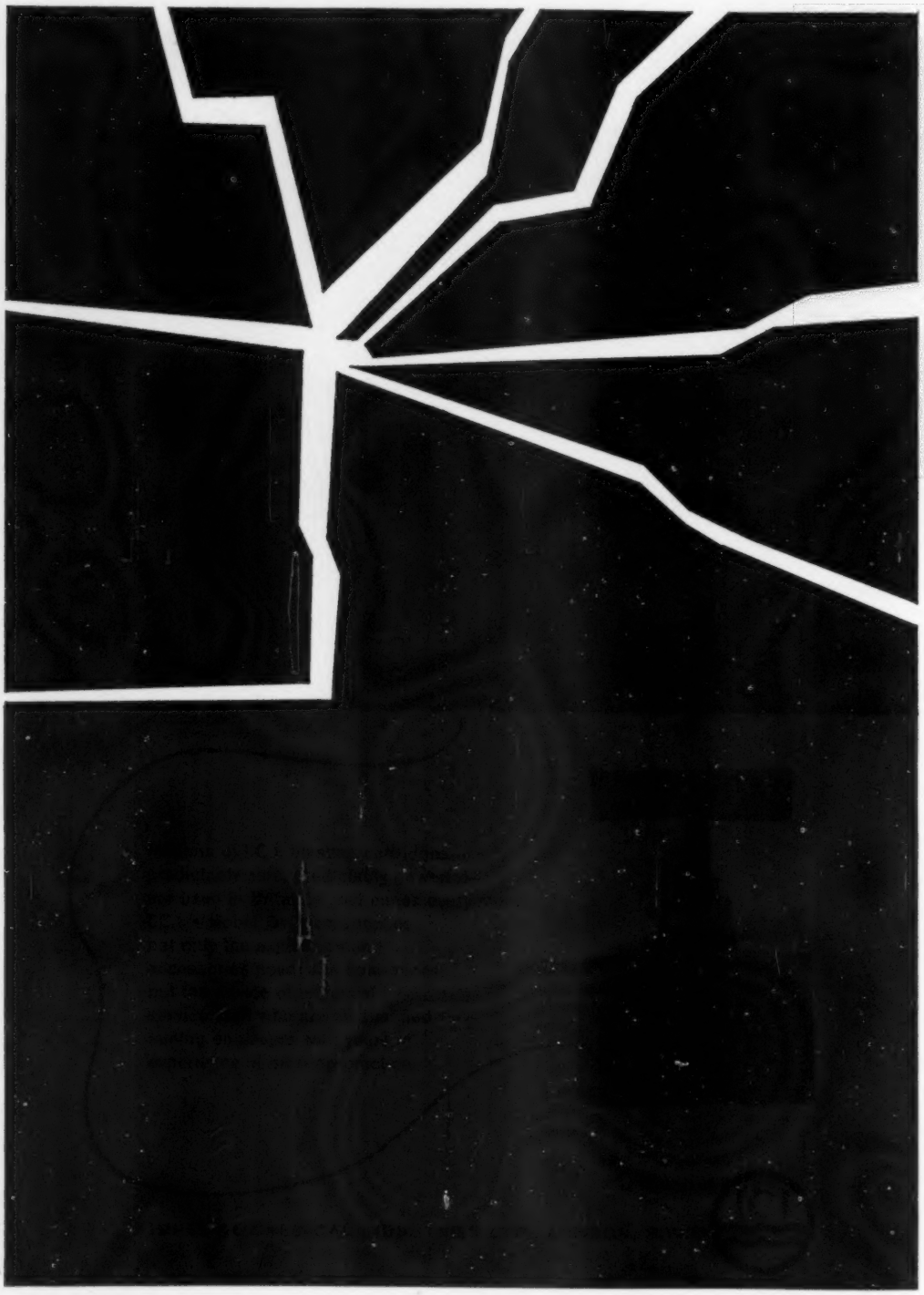
In the early days of the industrial revolution manufacturers frequently looked for familiar and easily recognisable descriptions of their products. To the countryman transplanted into industrial surroundings nothing was more familiar than a pig; a fact which is emphasised by carvings in scores of old churches depicting pigs suckling their litter, rooting for acorns and playing the bagpipes. (Apparently this last pastime was forsworn by pigs many years ago because of unpleasant associations between bagpipes and pigs bladders.) Consequently, when iron from Blast Furnaces was directed into long troughs and from there into short and narrow troughs placed at right angles, a resemblance to sows suckling their appendaged litter led to the description of 'pig iron'.

This series of advertisements illustrates some of the 'ecclesiastical' pigs and emphasises the 50,000,000 'special' pigs which Warner and Company have supplied to Iron Foundries producing High Duty Castings.

WARNER WARNER WARNER

"Pioneers of Refined Pigiron"

KA WARNER & CO. LTD., MIDDLESBROUGH



COLES

ANNOUNCE THE

FOUR TON LEDA

Here is a crane with everything! Fast travel; all controls from one position; power-assisted steering; full-circle-slewing; automatic safety features; speed with precision and safety; 12 feet kerb radius manoeuvrability; road and yard performance... It's a Coles diesel-electric quality specification at a world beating price!

Available with either cantilever or strut jib (with outriggers on strut version).

1032

Coles Cranes is a Registered Trade Mark

COLES CRANES

THE NAME THAT CARRIES WEIGHT

STEELS ENGINEERING PRODUCTS LTD.

STEEL HOUSE, EASTCOTE, MIDDLESEX.
SALES AND SERVICE: LONDON, BRISTOL, BIRMINGHAM, MANCHESTER, LEEDS, NEWCASTLE, GLASGOW.

MINING EQUIPMENT

CRAWLEY

CRAWLEY WILCOX CONTINUOUS MINERS
CRAWLEY MIDGET MINERS
LO-HITE ARMOURED SNAKING CONVEYORS
HEAVY DUTY SNAKING CONVEYORS
STATIONARY BUNKER-CONVEYORS
MOBILE BUNKER CONVEYORS
EXTENSIBLE STAGE LOADERS
MOBILE STAGE FEEDERS
MOBILE STAGE LOADERS
EXTENSIBLE TUB LOADERS
MOBILE & EXTENSIBLE STAGE
COAL BUNKER UNITS

Write for **CRAWLEY** *"Mining Equipment" Catalogue NOW!*

THE CRAWLEY MIDGET MINER

A Low Seam Wide Buttock Loader For Seams 18 in. and upwards.

Operation

1 As boring arms rotate coal passes from one arm to next until outer arm loads on to conveyor.
2 Peripheral side cutting chain clears the coal not loaded by trepanning arms and completes loading.

Semi-Automatic Control

Can be fitted with sensing device consisting of gamma ray source which automatically adjusts vertical height of machine depending upon the relative thickness of coal and rock between the source and the receiver due to preferential scattering by rock as compared with coal.

Appreciation

1 The first practical thin seam miner.
2 The first thin seam miner under semi-automatic control.

Performance

1 Seams 18 in. to 30 in.
2 Depth of cut 4ft. 6in. to 4ft. 9in.
3 200 tons per shift in 2ft. 6in. seam actually achieved.

Specifications

1 Single-ended longwall cutting machine with four boring arms phased at an angle of 72° to each other.
2 Boring arms operated ahead of periphery chain clearing uncut and unloaded coal.
3 Chain includes flight picks bored to ensure complete coal loading.
4 Water jet dust suppression system.
5 Cutting height adjusted by fitting jib inserts.

All Crawley Heavy Duty Machines have the following units standard and interchangeable:

DRIVE FRAME • GEAR BOX • GEAR ASSEMBLIES
EXTENSION SECTIONS • STRUCTURE • TAIL UNIT
CHAIN FLIGHTS

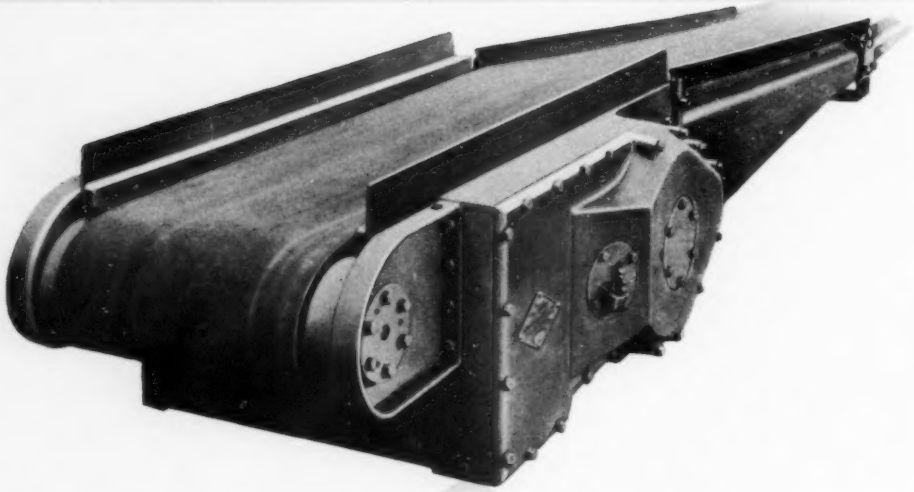
CRAWLEY INDUSTRIAL PRODUCTS LTD · LLANELLY
CARMARTHENSHIRE · S. WALES · Tel: Llanelly 4233

AYLING INDUSTRIES GROUP

CRAWLEY

For Handfilled Faces

Compact and Reliable Conveyors



with neoprene-lagged drums

25F/1

BJD

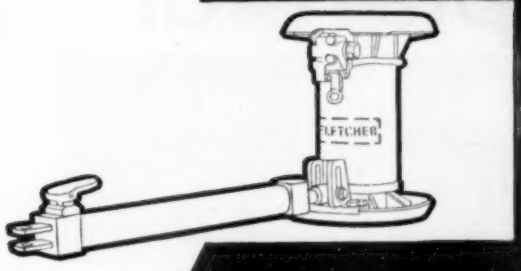
Face Belt Conveyors

BRITISH JEFFREY-DIAMOND LTD., MINING DIVISION, WAKEFIELD, YORKSHIRE

wf 5229

FLETCHER DESFORD CHOCKS

in action



Photograph by courtesy NCB

Following successful installations in the East Midlands Division, the Fletcher Desford hydraulic chock has gained a reputation for reliability.

50 and 100 ton versions: 6″ to 18″ stroke at 2″ intervals.

Fully approved by N.C.B —H.15 and H.11.

Ancillary equipment by Fletcher includes:

double-acting hydraulic ram up to 2′-6″ stroke

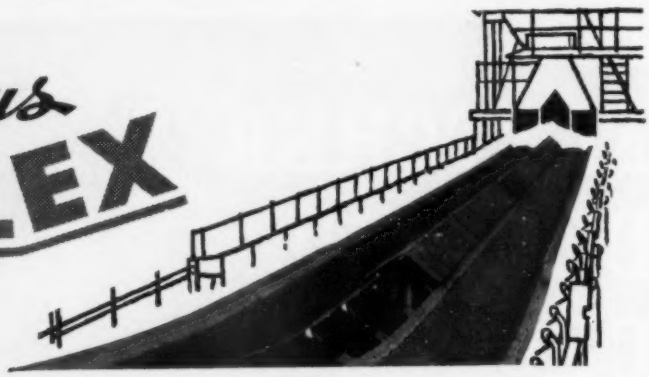
detachable ram anchor brackets

extension pieces 6″ & 12″

Full technical information from

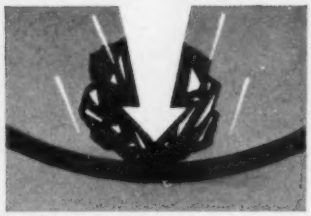
GEORGE FLETCHER & CO. LTD., Masson Works, Litchurch Lane, DERBY · Telephone: Derby 45817 · Telex 37514

Angus GAFLEX

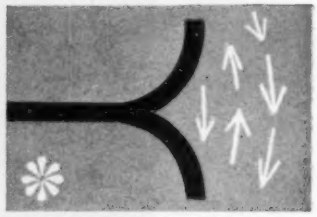


..the belt with the

Careful analysis of causes of failure in conventional belts has led to the development of Gaflex—the nylon wefted conveyor belt with five improved characteristics.



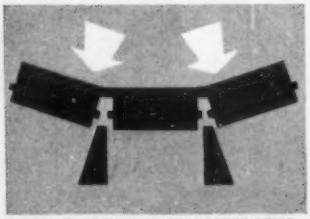
SUPERIOR IMPACT RESISTANCE . . . . . .



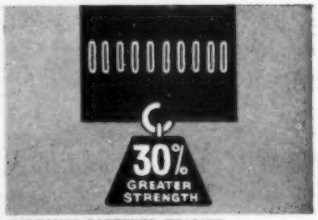
IMPROVED FLEXING LIFE . . . . . .

five point plan for

SUPERIOR TEAR RESISTANCE . . . . . .



IMPROVED TROUGHING CHARACTERISTICS . . .



IMPROVED FASTENER HOLDING . . . . . .

better performance

★ *The flex life of the belt (previously the prime ageing factor of conveyor belting) is outstandingly increased by the nylon weft in Gaflex. The nylon weft gives supreme 'across the belt' strength and, at the same time, allows for a reduction in belt thickness —four plies of the new fabric are equal in strength to five conventional fabric plies.*

GAFLEX has nylon weft for *extra* strength and flexibility

GEORGE ANGUS & CO LTD. Angus House, Westgate Road, Newcastle upon Tyne, 1 • *Export Division: 300, Grays Inn Road, London W.C.1.*

Perhaps one day he'll drop us a line

Small fry today . . . but what tomorrow?
The odds are that he won't ever be worried about conveying problems, but, for those of his contemporaries who inevitably will, Sutcliffe is a name to keep in mind. Our conveying equipment has worked wonders in all fields of industry, often where other methods could not succeed. If you have to move bulk materials from A to B—whatever lies between—make a start by writing for brochure IR/125.

It's never too early to ask

Sutcliffe

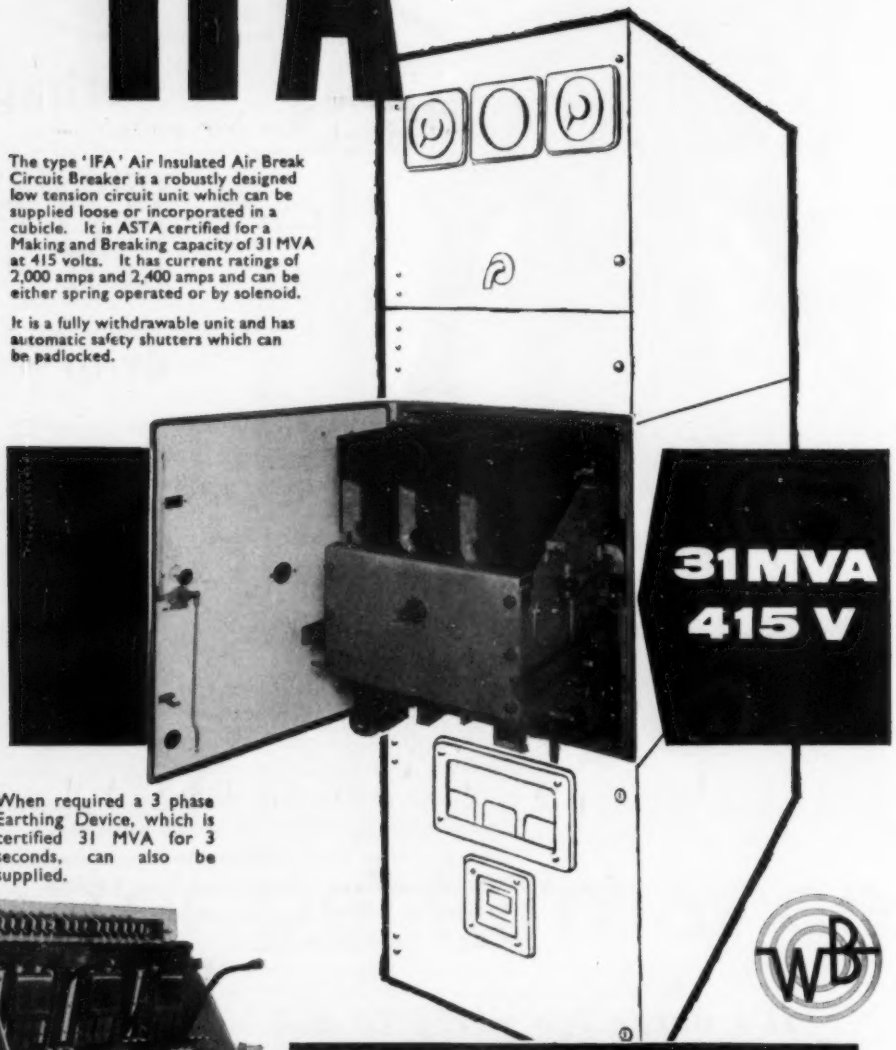
RICHARD SUTCLIFFE LIMITED · HORBURY · WAKEFIELD · ENGLAND

London Office: 28/29 Savile Row, W.1.

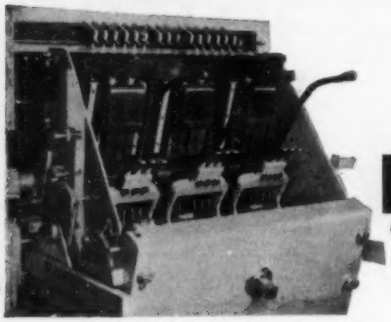
TYPE IFA AIR BREAK SWITCHGEAR

The type 'IFA' Air Insulated Air Break Circuit Breaker is a robustly designed low tension circuit unit which can be supplied loose or incorporated in a cubicle. It is ASTA certified for a Making and Breaking capacity of 31 MVA at 415 volts. It has current ratings of 2,000 amps and 2,400 amps and can be either spring operated or by solenoid.

It is a fully withdrawable unit and has automatic safety shutters which can be padlocked.



When required a 3 phase Earthing Device, which is certified 31 MVA for 3 seconds, can also be supplied.



WHIPP & BOURNE LTD.

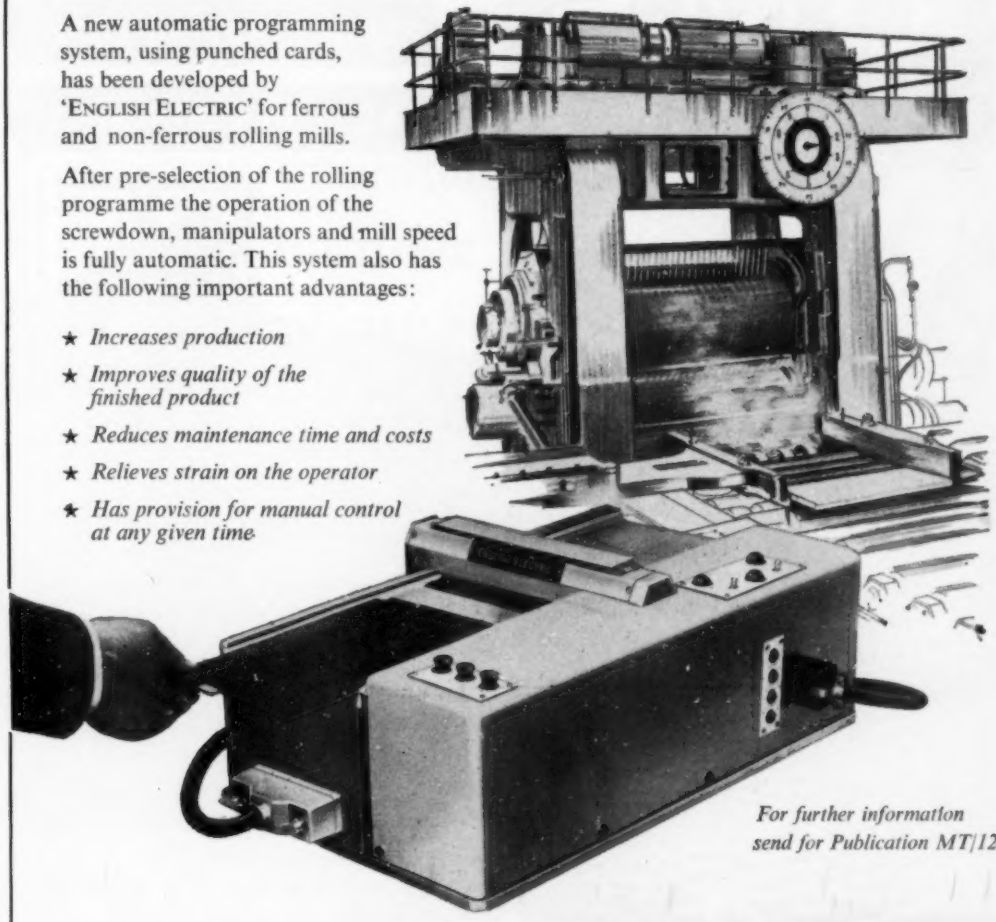
CASTLETON · ROCHDALE · LANCS

AUTOMATIC MILL PROGRAMMING

A new automatic programming system, using punched cards, has been developed by 'ENGLISH ELECTRIC' for ferrous and non-ferrous rolling mills.

After pre-selection of the rolling programme the operation of the screwdown, manipulators and mill speed is fully automatic. This system also has the following important advantages:

- ★ *Increases production*
- ★ *Improves quality of the finished product*
- ★ *Reduces maintenance time and costs*
- ★ *Relieves strain on the operator*
- ★ *Has provision for manual control at any given time*



For further information send for Publication MT/126

'ENGLISH ELECTRIC' rolling mill experience is world wide and for more than half a century the Company has promoted new techniques for mills of all types working under widely different conditions. This experience is available for planning and electrically equipping new mills and the modernisation of existing mills.

'ENGLISH ELECTRIC'

rolling mill equipment

METAL INDUSTRIES DIVISION, STAFFORD

The English Electric Company Limited, English Electric House, Strand, London, W.C.2.

MT.62

"DMS"

HEAVY MEDIA SEPARATOR

FOR SEPARATING COAL

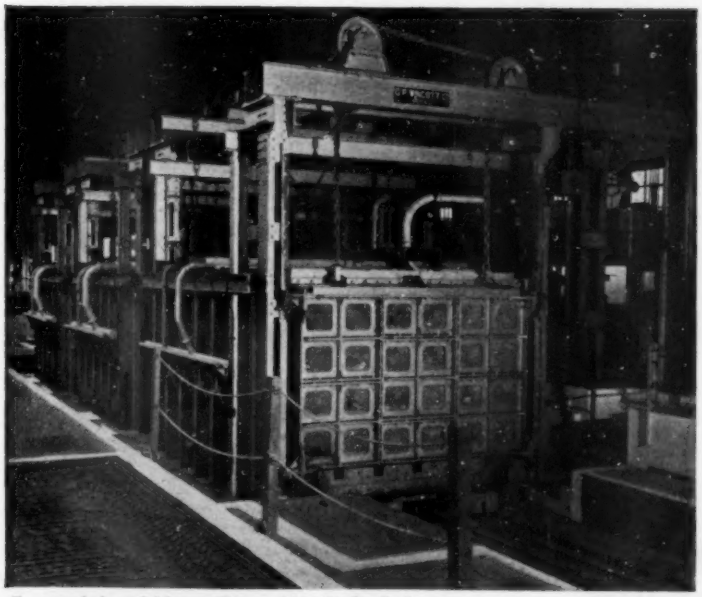
AND OTHER MINERALS

unifloc

UNIFLOC LIMITED, SWANSEA, GREAT BRITAIN
TEL. 55164 (3lines) GRAMS 'UNIFLOC' S. WALES.

- Extreme accuracy in separation
- Simplicity of design
- Low power consumption
- Maximum flexibility with ability to separate any type of coal, middlings and shale mixture in any proportion without any alteration in settings
- Operates equally well when treating 95% shale as when handling 95% coal in the raw feed
- Capable of separating coals from size 20" down to $\frac{1}{16}$" square mesh
- Predetermined change of gravity in vessel can be achieved in less than five minutes
- Single vessels with capacity up to 700 tons per hour in operation

Cut fuel and labour costs in your **Steel Foundry** and achieve continuity of production by installing a **Triple Chamber Quenching Furnace**



By permission of Messrs. Edgar Allen & Co. Ltd.

The three separate chambers of this City Gas Fired Furnace are 12′ 0″ long × 10′ 0″ in effective width. They are each equipped with two electrically operated self-locking doors and operate as independent units.

The castings are preheated from cold to 300°C. in the first chamber and then pass to the second chamber where they are raised to 750°C. They are finally heated to 1100°C. in the third chamber and after soaking are quickly withdrawn by an extractor gear and conveyed to the oil or water tanks for quenching. The chambers are equipped with instruments for the automatic control of temperature, air/gas ratio and pressure. Prescribed heating curves can easily be maintained.

By utilising the third chamber as a cooling chamber the furnace can be employed for annealing purposes. When desired the first and third chambers can be independently used for the batch treatment of castings.

Wincott
FURNACES

G. P. WINCOTT LIMITED, SHEFFIELD, ENGLAND.

TELEPHONE: 20211/2
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STEPHENS'

Super Grade Low Alumina Silica Brick

KILN CAPACITY OVER 1½ MILLION BRICKS

- FINE SILICA CEMENT FOR SETTING SILICA BRICK
- STIGNIC CEMENT FOR BASIC STEEL LADLES
- SPECIAL FIRE CEMENTS for different purposes
- STEPHENS' SPECIAL ELECTRIC FURNACE ROOF BRICKS
- REGENN BRICK without doubt the best Brick for Soaking Pits, Checkers, and Regenerator Chamber Walls

Stephens SILICA BRICK CO., LTD.
KIDWELLY

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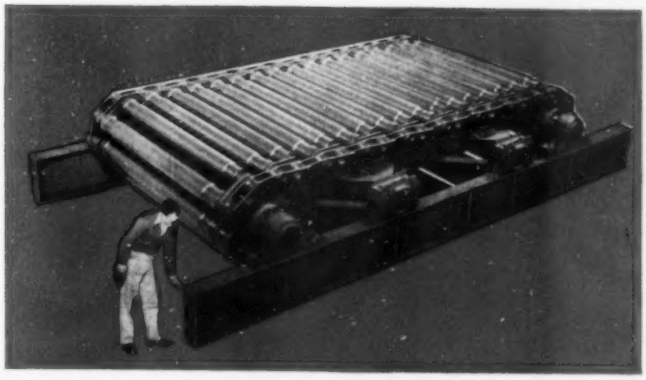
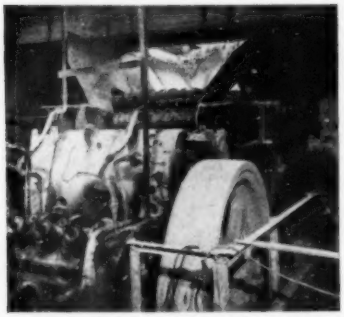
FEEDING



(*Right*) Ross Patent Drop-Bar Feeder, Size No. 12. Note massive sprung shock absorbing support frame under top strand of apron.



Discharge end of Ross Drop-Bar Feeder. Photograph by courtesy of The Cement Marketing Co.

Heavy apron bars of Ross Drop-Bar Feeder as seen from dump truck. Photograph by courtesy of The Cement Marketing Co.

ROSS PATENT DROP-BAR FEEDERS are of rugged design in a wide range of sizes. The larger machines handle material up to five foot cube at more than 2,000 tons per hour—fitting colleagues of the modern giant diggers and crushers.

The two photographs on the left are of a No. 9 machine installed 35 years ago at the Penarth Works of The British Portland Cement Manufacturers Ltd., and are proof of the built-in DEPENDABILITY which has kept it working satisfactorily and economically since 1926.

ROSS MATERIAL HANDLING EQUIPMENT

FOR THE IRON & STEEL, QUARRYING AND MINING INDUSTRIES

ROSS ENGINEERS LIMITED, 11 WALPOLE RD., SURBITON, SURREY

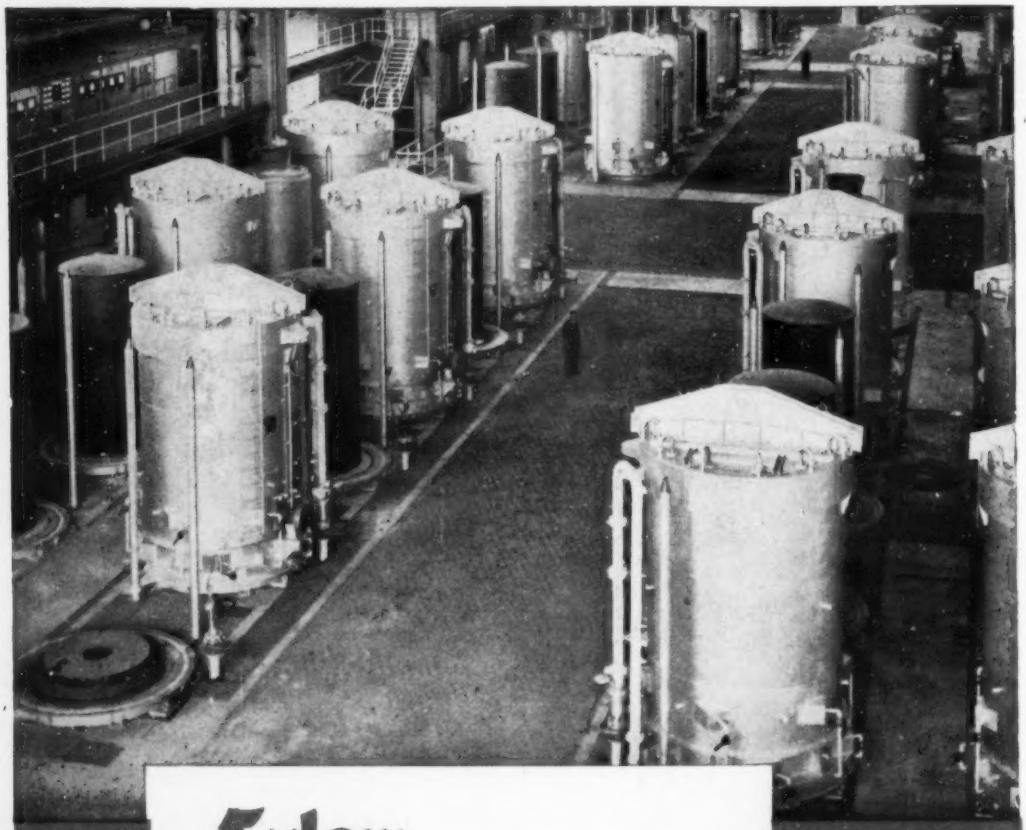
Telephone: Elmbridge 2345 and 2903

ROSS SCREEN & FEEDER CO., WESTFIELD, NEW JERSEY, U.S.A.

CANADIAN LICENCEES: DORR-OLIVER-LONG LTD., ORILLIA

ROSS

MDB 1



Salem for many years builders of modern multi-stack coil annealing plants now offer in collaboration with Messrs. Matthias Ludwig of Essen, the most up-to-date single stack coil annealing plants for both sheet and tin plate. More than 300 furnaces installed during the last 10 years.

Salem design, build and put into operation complete plant with all ancillaries.

Salem ~ BROSIUS

MATTHIAS LUDWIG ESSEN
INDUSTRIEOFENBAU

SALEM-BROSIUS (ENGLAND) LIMITED · MILFORD HOUSE · MILFORD · Nr. DERBY · Phone: Duffield 2271 · Grams: Konner "Belper"

P.5702

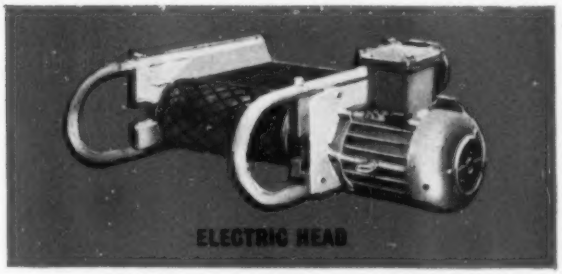
Here's a NEW

INBYE TRANSFER CONVEYOR

by "PIKROSE"

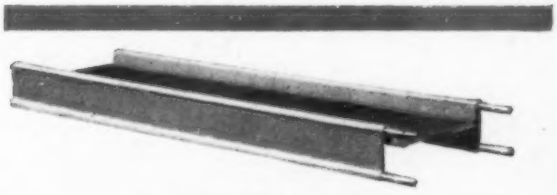
5 h.p. 16 ins.

- ☐ **'ALL STEEL'** Robust construction
- ☐ **NEOPRENE** Grooved Driving Band
- ☐ **FULLY SEALED** Driving Drum
- ☐ **BELT SPEED** 147 ft.p.m.
- ☐ **STANDARD SECTIONS** with intermediate units building up to various lengths; max. 24' 0"
- ☐ **HIGH TENSILE STEEL GEARS**
- ☐ **REVERSIBLE BELT DIRECTION**
- ☐ **WIPING BLADE REMOVES**
- ☐ **5. H.P. FLAMEPROOF MOTOR** or alternatively with Air Motor

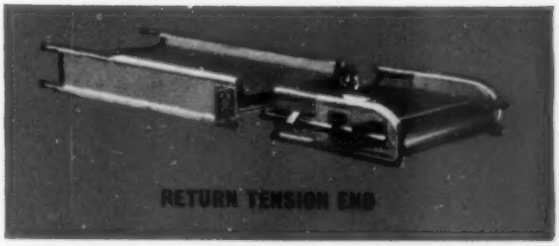


ELECTRIC HEAD

TAPERED SECTION



PARALLEL SECTION



RETURN TENSION END

PIKROSE

AUSTIN HOPKINSON & CO. LTD

Mining Engineers

DELTA WORKS · AUDENSHAW · LANCASHIRE

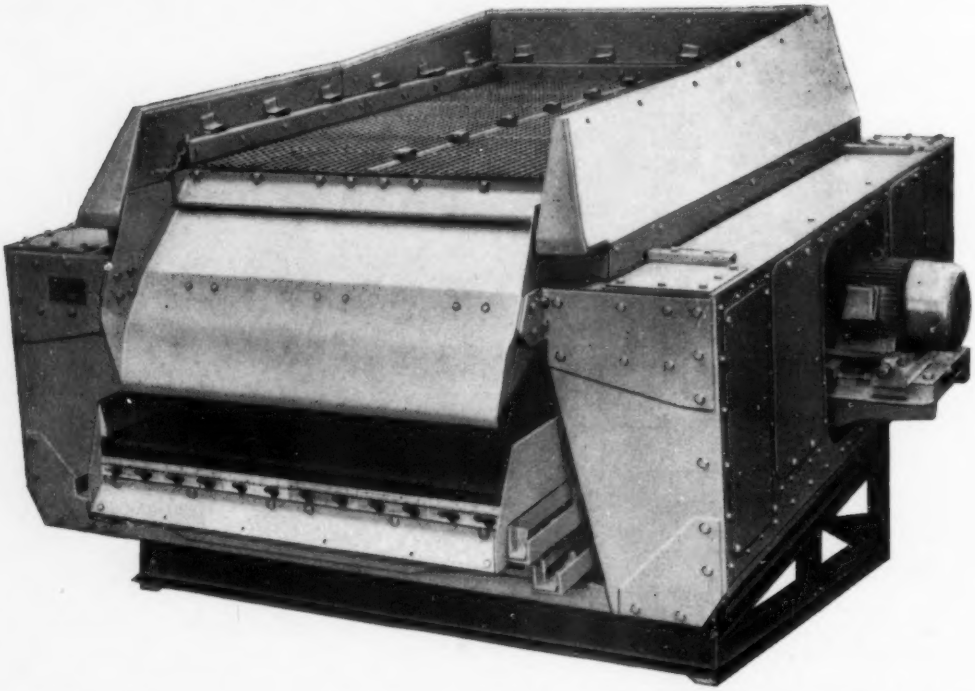
and PENYGROES, N. WALES.

AH164

UMBRA

(VICTOR HALSTRICK KG. HERNE)

FINES EXTRACTION SCREENS



The only Fines Extraction Screens which POSITIVELY CANNOT "BLIND"

Size separation as low as 1 mm. can be effected on any coals—regardless of moisture content.

★ WITHOUT HEATED DECKS

★ WITHOUT RESONANCE

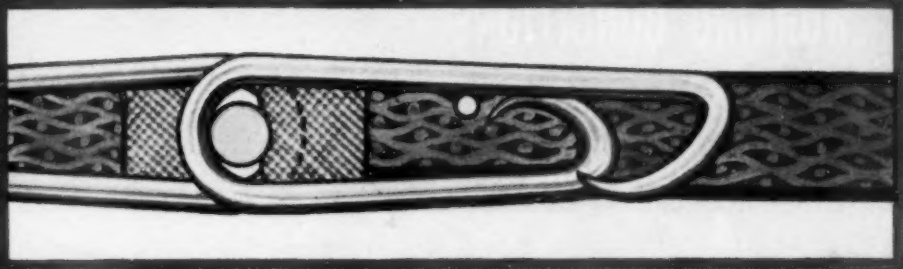
The introduction of the "UMBRA" Screen opens new lines of approach to many screening problems.

Sole Manufacturing and Sales Licensees for the United Kingdom:

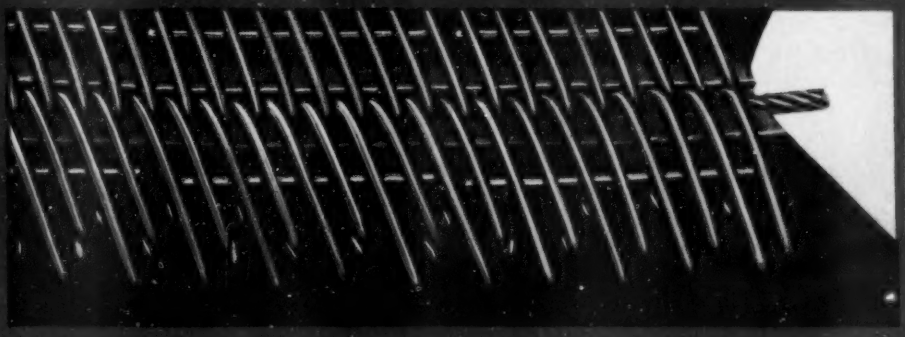
NORTONS-TIVIDALE LTD.

TIVIDALE · TIPTON · STAFFORDSHIRE *Telephone:* **Tipton 1201**

ONLY COMET FASTENERS



with the **Wedge action Clench**



give **Increased joint strength**

The profile of Comet's ground point, its smoothness and final plating ensure clean penetration with least disturbance of belt fabric....angle of entry and Comet's special wedge-action clench add greater strength to the joint.

On test, on the face, a Comet joint is stronger....longer.

Comet

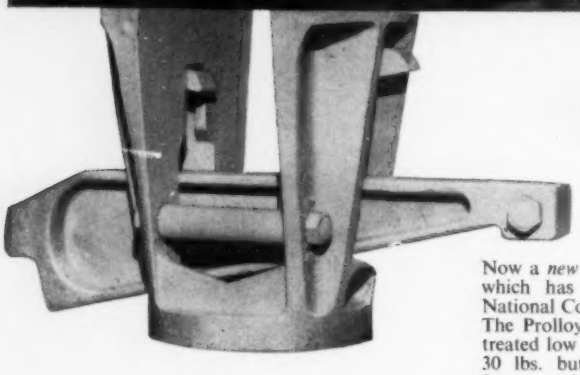
COLLIERY CONVEYOR BELT LACING SYSTEM

MASTABAR MINING EQUIPMENT CO. LTD.

AVENUE PARADE · ACCRINGTON · LANCASHIRE · TELEPHONE: 35411 (3 LINES)

SALES & SERVICE DEPOTS: CARDIFF · LONDON · NOTTINGHAM · LEEDS · ACCRINGTON · NEWCASTLE-UPON-TYNE

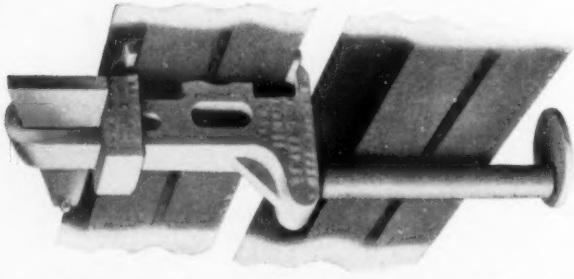
IMPROVE WORKING CONDITIONS AND SAFETY AT THE COALFACE



THE PROLLOY SLIDE BAR HEAD

Now a *new conception* in slide bar systems is presented which has been fully tested and approved by the National Coal Board.
The Prolloy Head is cast in one piece from fully heat treated low alloy steel to produce a unit weighing only 30 lbs. but with a very high strength/weight ratio. Jaw spread is eliminated even under the highest stress loads. Fitting any hydraulic prop, the Prolloy Head is equipped with gravity toggles which anchor it firmly on to the bar whilst rollers ease the advancement of the bar. 3½in. and 4in. heads are available and a 5in. head has been designed to accommodate the S.M.R.E. Roadhead Bar.

THE 'WRIGHT' ROLLER BRACKET



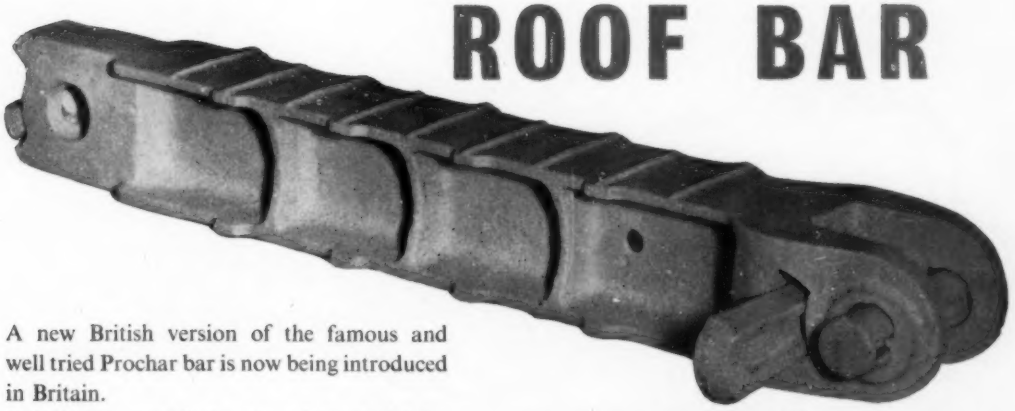
This simple unit saves valuable man hours and effort during the advancement of roof support bars at the roadhead by eliminating the arduous task of man-handling the bar; often in very confined spaces. The Roller Bracket is light in weight and can be easily attached or detached at any point along the length of the roof bar giving maximum flexibility to the support system.

PMD

PROLLOY MINING DEVELOPMENTS LTD.

Pear Tree Lane, Dudley, Worcestershire. Telephone: Dudley 52431
Exclusive Manufacturing Facilities:
Lloyds (Burton) Ltd. & Joseph Wright & Co. (Fabrications) Ltd.

Introducing . . **THE NEW PROLLOY ROOF BAR**



A new British version of the famous and well tried Prochar bar is now being introduced in Britain.

It is being manufactured and marketed by LLOYDS (BURTON) LIMITED and is called the NEW Prolloy Roof Bar.

The new bar, fully approved by the National Coal Board, has been subjected to stringent tests on the surface and underground.

Many modifications and new ideas have been incorporated into the new design, all calculated to give better and more economical service where it is needed—underground.

For further details ask for the Prolloy Technical Engineers to call, or ask for the leaflet which gives brief details and specification of the NEW PROLLOY Roof Bar.

N.C.B APPROVAL No B. 17

MANUFACTURED & MARKETED BY

LLOYDS

(BURTON) LIMITED

WELLINGTON WORKS · BURTON ON TRENT

TEL. BURTON 5661 TELEX 34-365

The place

COAL HANDLING WITH THE **CASE W12** AT

Wherever there's a tough materials-handling job, that's the place for **Case**. Case offers you:

STABILITY Rear-mounted engine, low centre of gravity and extra-wide track to ensure complete stability at all times.

SAFETY Bucket arms pivoted ahead of the driver to give increased safety, visibility and reach.

SERVICE Automatic free service at 50,250, and 500 hours, regular free inspection and advice and a flying squad for emergencies to keep Case on the job.

Consider these advantages and you have—

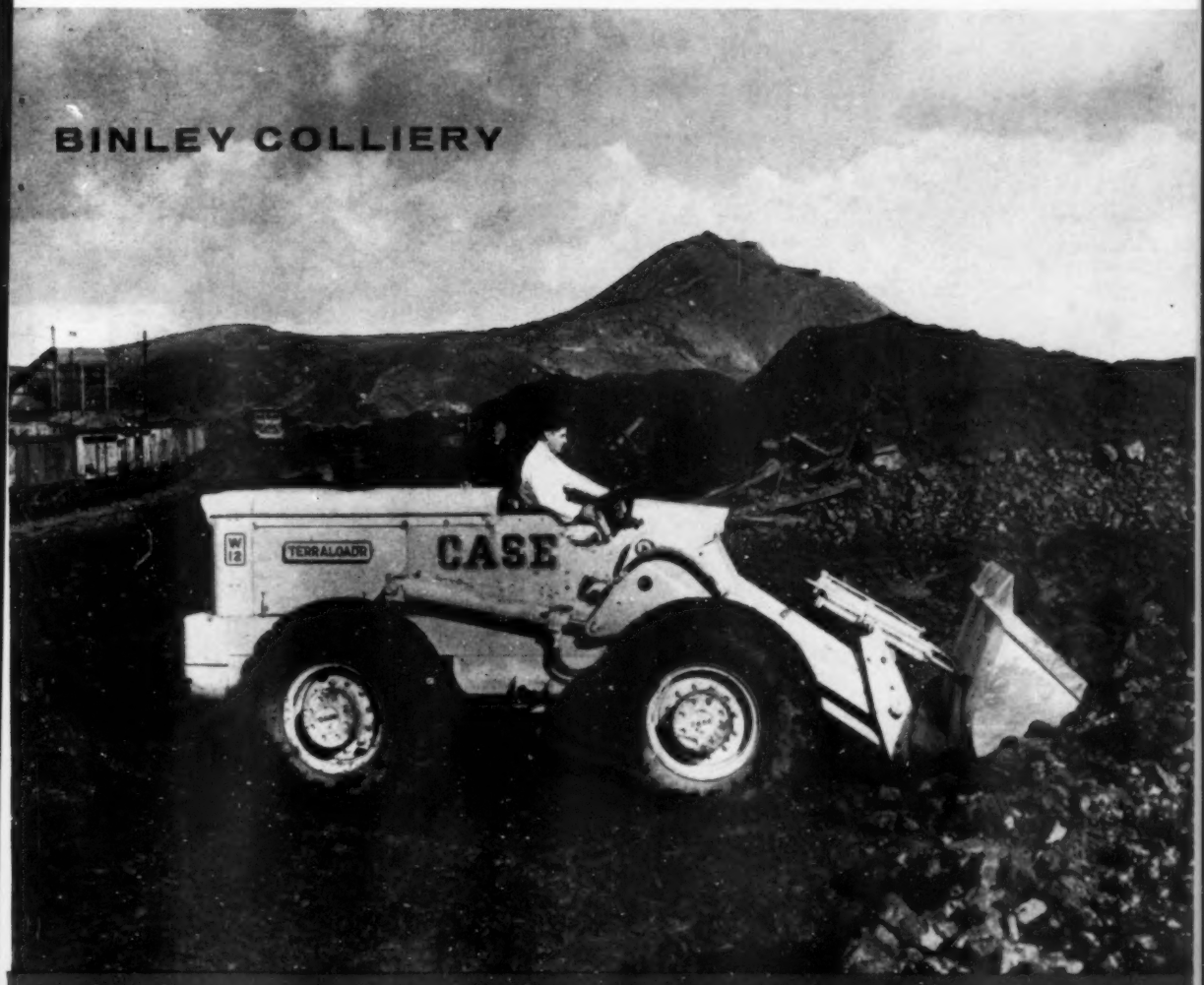
the case for Case

FROM THE **CASE** RANGE THERE'S A TERRALOAD'R TO FIT YOUR NEEDS

Better balance
Faster cycles
Greater visibility

	TERRALOAD'R W12	TERRALOAD'R W9	TERRALOAD'R W5
BUCKET CAPACITY	1⅜—3½ CU YD	1¼—2½ CU YD	1 and 1½ CU YD
HORSE POWER	120	80	57
LIFT AT 0 MPH	15,000 LB	11,000 LB	4,500 LB
CARRY AT 4 MPH	9,000 LB	5,500 LB	3,000 LB
BREAKOUT FORCE	23,500 LB	13,500 LB	7,800 LB
MAX. SPEED MPH	24	23	23
FORWARD REACH (to tyres)	6 FT 3½ IN	5 FT 2½ IN	3 FT 0 IN

for CASE



CASE

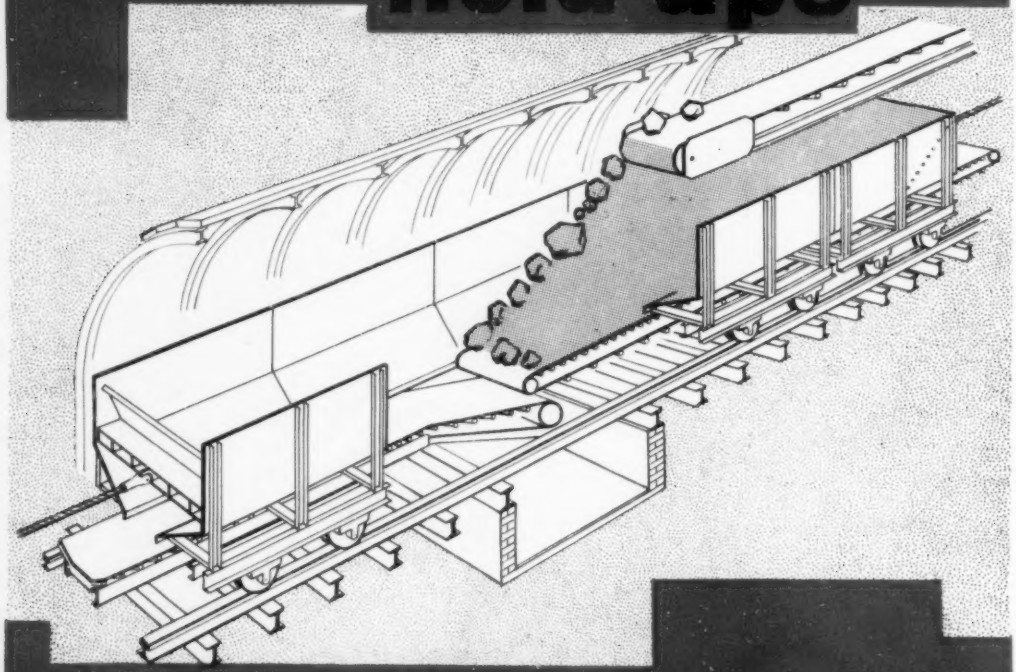
J. I. CASE COMPANY LTD

West Drayton, Middlesex. West Drayton 4291. Stanningley, Leeds. Pudsey 77366

WORLD LEADERS IN EARTHMOVING TRACTOR DESIGN

Sole Distributors: Scotland—Scottish Plant Sales Ltd. Wales—Wm. Lewis (Tractors) Ltd. N. Ireland—George Cohen Sons & Co Ltd

minimise production breakdown hold-ups



THE WALKER-HORROCKS ANTI-BREAKAGE MOBILE STORAGE BUNKER

Developed in No. 5 Area, East Midlands Division, N.C.B.

Now you can ensure a steady production flow during haulage and shaft breakdowns or derailments *with the absolute minimum of degradation*. The Walker-Horrocks Bunker collects coal from the inbye conveyor forming a reservoir of 50 to 400 tons (5 to 40 cars) during hold-ups. It can also be used as a Storage Unit for backshift working. Easily operated by the Transfer Point Attendant, the Bunker can be installed by normal pit labour. Installation does *not* interfere with normal working.

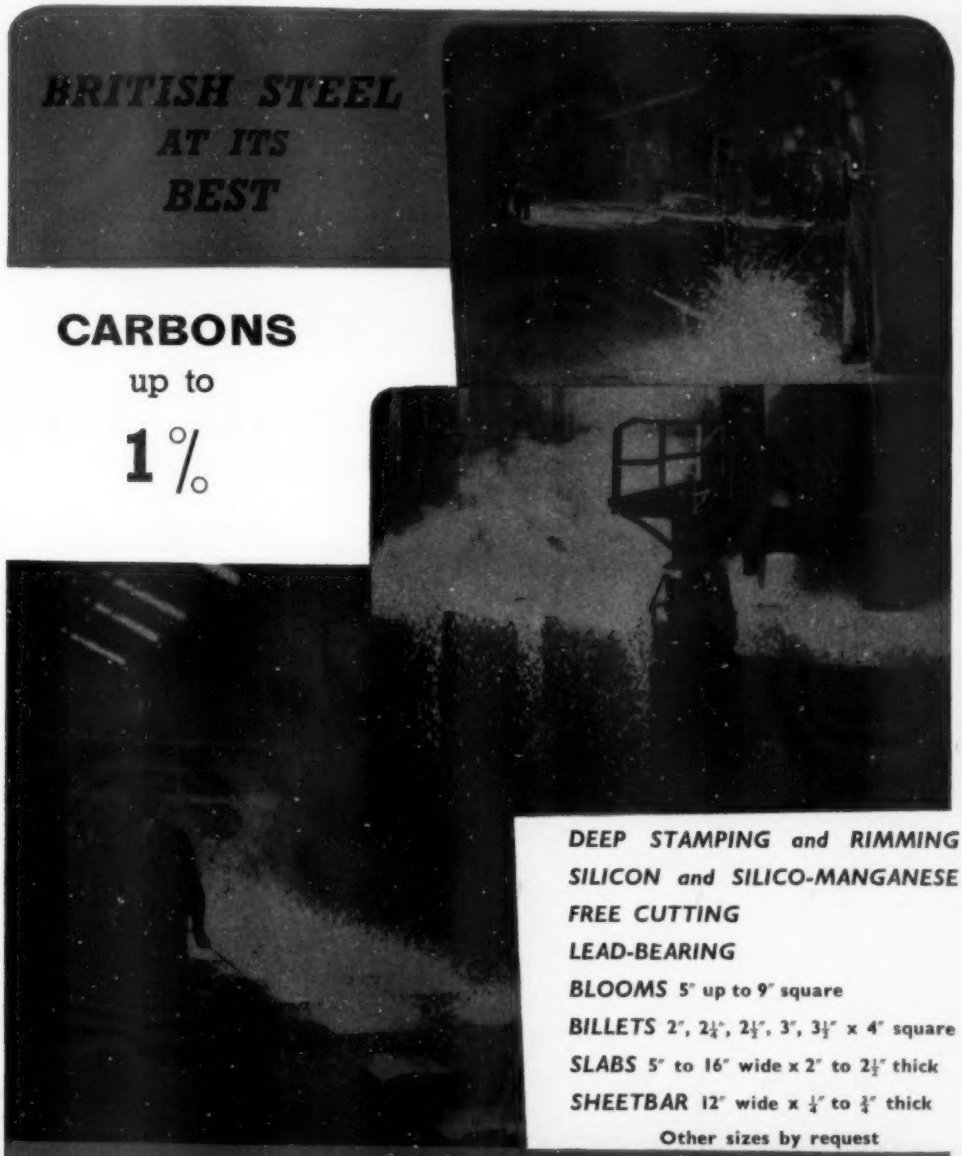
Further technical information available from the manufacturers.

WILLIAM RIGLEY & SONS LTD

BULWELL FOREST, NOTTINGHAM
TELEPHONE: NOTTINGHAM 27-8581

BRITISH STEEL AT ITS BEST

CARBONS up to 1%



DEEP STAMPING and RIMMING
SILICON and SILICO-MANGANESE
FREE CUTTING
LEAD-BEARING
BLOOMS 5" up to 9" square
BILLETS 2", 2¼", 2½", 3", 3½" x 4" square
SLABS 5" to 16" wide x 2" to 2½" thick
SHEETBAR 12" wide x ¼" to ¾" thick
Other sizes by request

LYSAGHT'S SCUNTHORPE

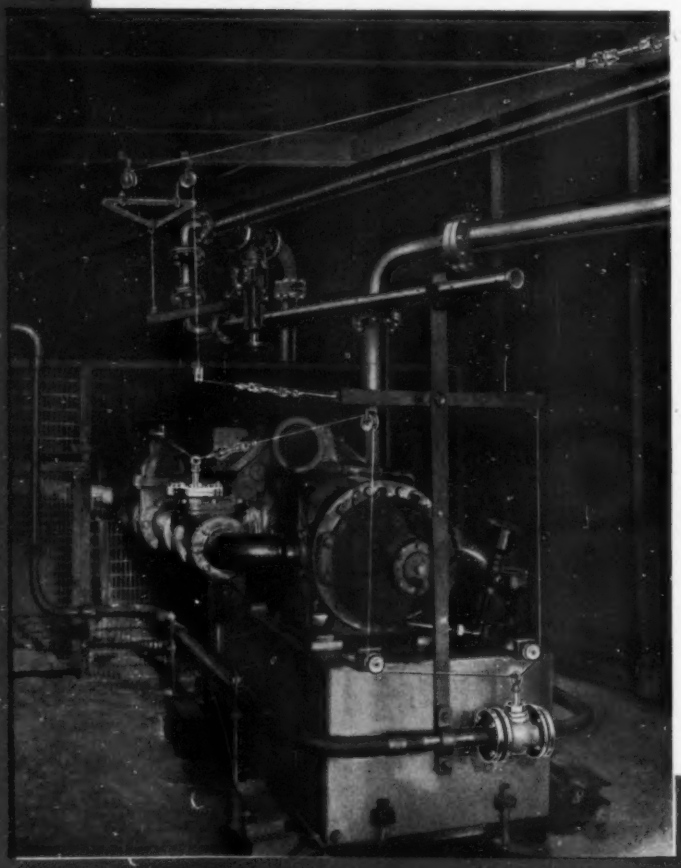
LYSAGHT'S SCUNTHORPE WORKS, NORMANBY PARK STEEL WORKS, SCUNTHORPE, LINCOLNSHIRE
Branch of G.K.N. Steel Company Limited Telex No. 52174 Telephone: SCUNTHORPE 2271 (7 lines)

LINDLEY

AUTOMATIC FIRE PROTECTION FOR METHANE DRAINAGE INSTALLATIONS

AUTOMATIC THERMAL VALVE

PATENT NOS. 803861 AND 803862



Typical Installation of Lindley Automatic Thermal Valve on a Methane Extraction Pump

WATER BARRIER

Water barrier created in pump house and 50 yards of roadway on collapse of a fusible link or links at the very low temperature of 140 deg. F.

PUMP STOPPED

Simultaneously with the collapse of a link the pump is stopped by the automatic operation of a special shut-off valve on the compressed air intake of the pump.

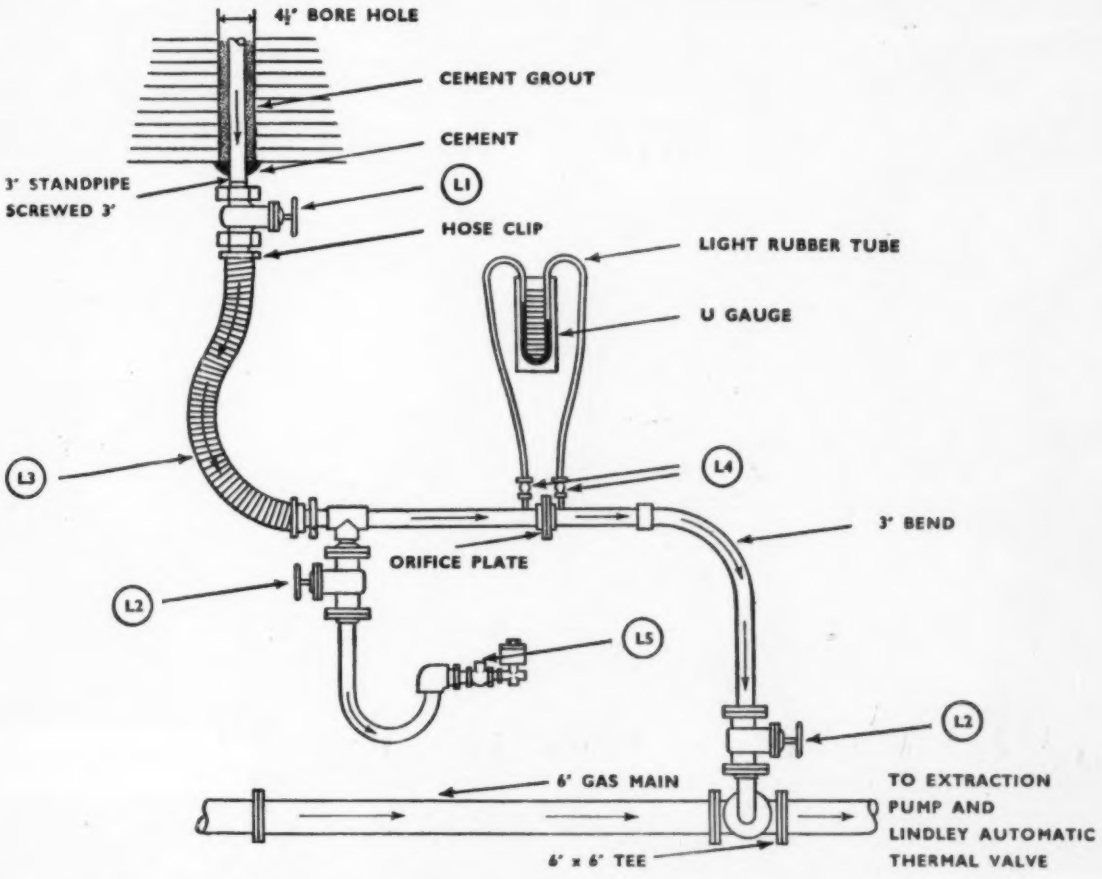
NO SEEPAGE

Drawing off and seepage of methane through the pump is automatically stopped by a special shut-off valve on methane range into pump.

Any number of collapsible links can be fitted to one valve in anticipation of possible risks.

YET ANOTHER LINDLEY "PIT JOB"

LINDLEY VALVES & FITTINGS FOR INDIVIDUAL BORE HOLES



L1 LINDLEY 3" SCREWED GUNMETAL FULLWAY GATE VALVE

L2 LINDLEY 3" FLANGED GUNMETAL FULLWAY GATE VALVE

L3 3" INTERNALLY REINFORCED SUCTION HOSE (4" ENDS) BY LINDLEY

L4 LINDLEY ¼" SCREWED GUNMETAL SQUARE HEADED COCKS

L5 LINDLEY AUTOMATIC WATER RELIEF VALVE UNIT

LARGER SIZES OF VALVES UP TO 12" IF REQUIRED

H. LINDLEY LIMITED

DEANSTONES WORKS - DEANSTONES LANE

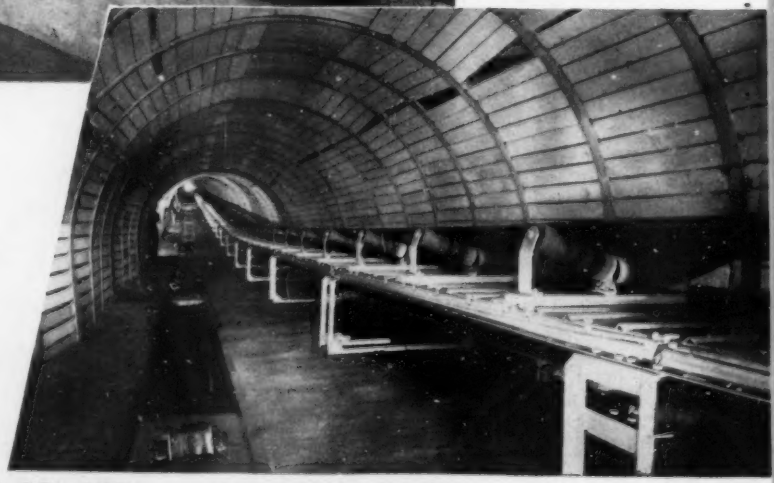
QUEENSBURY - Nr. BRADFORD

TELEPHONE: QUEENSBURY 2292/3.

MAXIMUM ECONOMY IN DRIFT TRANSPORT

WITH Meco CONVEYORS

Photograph by permission of the National Coal Board.



The top illustration shows a Meco power pack rated at 45,000 ft. lbs. used as a single drive for a double drum belt conveyor driving head. The conveyor is 2,146 ft. long with a lift of 478 ft. and carries 2,000 tons/day run-of-mine coal. The H.P. rating is 300 at 400 ft./min.

MECO STANDARD POWER PACKS, SINGLY OR IN COMBINATION, CAN BE BUILT UP TO THE MAXIMUM POWER OF ANY AVAILABLE HIGH DUTY CONVEYOR BELTING.

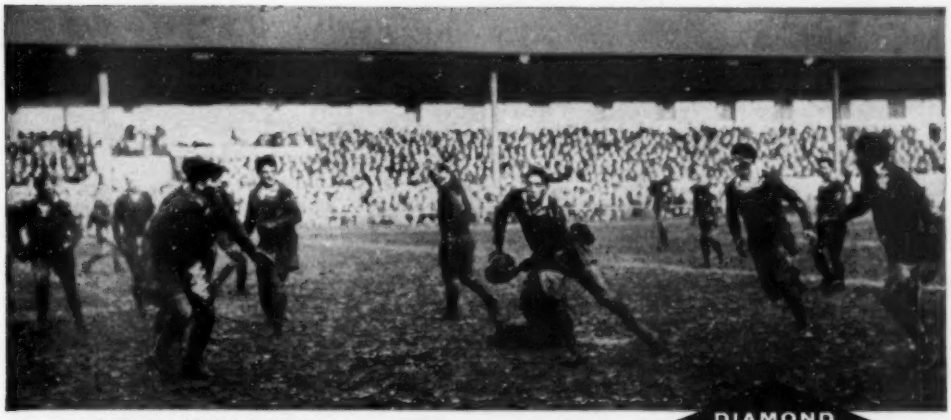
THE MINING ENGINEERING CO. LTD.,

MECO WORKS, WORCESTER, ENGLAND.

Telephone: Worcester 22291 (7 lines).
Telegrams: MECO Worcester.
London Office: 50 Pall Mall, London, S.W.1.
Telephone: Trafalgar 4686/7.
Cablegrams: Mecomonde, Piccy, London.

L.P. 211—110

where wet conditions are a hazard



Photograph by courtesy of Hull Daily Mail

DIAMOND TYPE

Fenaplast

COLLIERY CONVEYOR BELTING

is the answer!

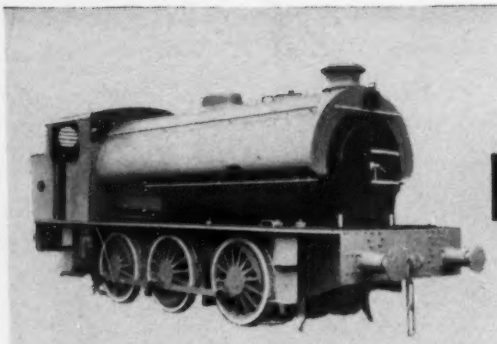
Like international forward John Whiteley,
Fenner Diamond type belting is a top-class performer under all conditions.
Why? Because the handling ability of Diamond belting is backed by a cover defence that withstands even the injurious attack of mine water.
The all-round strength of this new range of colliery conveyor belting eliminates breakdowns in vital movements—
puts an end to the penalty of production losses.
It is proving a winner in all tests . . . especially where wet conditions are a hazard.

RANGE OF DIAMOND TYPE BELTINGS AVAILABLE					
N.C.B. APPROVAL NO.	150	158	149	158 HD	149 HD
TYPE	LIGHT DIAMOND	STANDARD DIAMOND	DOUBLE DIAMOND	HEAVY DIAMOND	EXTRA HEAVY DIAMOND
BREAKING LOAD MINIMUM PER INCH WIDTH	2000 LB	2000 LB	2500 LB	3000 LB	4000 LB
THICKNESS	7½ mm	8 mm	8 mm	8 mm	9 mm

J. H. FENNER & CO. LTD. HULL

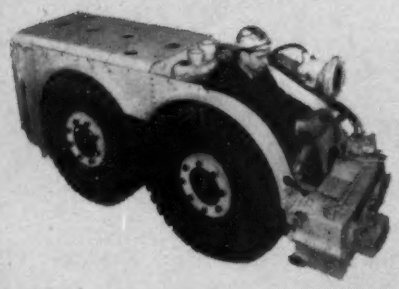
LARGEST MAKERS OF V-BELT DRIVES IN THE COMMONWEALTH

Whatever the job haul with... HUNSLET



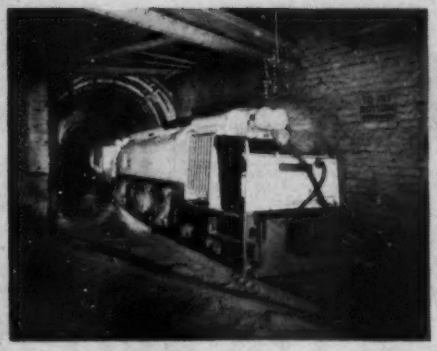
HUNSLET *"AUSTERITY" LOCOMOTIVE*

'Austerity' locomotives are now being offered with the latest underfeed firing equipment. In addition to building new 'Austerities' 'Hunslet' has organised a Repair Scheme specially for the Austerity Locomotive and being the designers can offer the most economic prices. A large stock of spares makes for a speedy return to service.



HUNSLET *MINES TRACTOR*

The MT.25 Flameproof Mines Tractor is robust, self-contained, and does not require rails or a specially prepared roadway. It can operate where high coal dust and methane contents in the atmosphere may be encountered. The basic unit is equipped with a hydraulic pump and the frame is drilled to receive ancillary equipment, for example:—Angle Dozer, Shovel Loader, Fork Lift, Winch and Trailers, etc.



HUNSLET *DOUBLE ENDED MINES LOCOMOTIVE*

The Hunslet flameproof diesel range covers from 23 to 100 h.p. and includes units with single or double-ended driving positions. Electric trolley or battery locomotives with differential drive can also be supplied.

Photograph by kind permission of the National Coal Board.

HUNSLET ENGINE CO. LTD · LEEDS 10

ONE OF THE HUNSLET GROUP OF COMPANIES

London Office : LOCOMOTIVE HOUSE, BUCKINGHAM GATE, S.W.1.

H98

All the world rolls along on steel

STEEL BALL BEARINGS are as essential to the smooth progress of the Chairman's limousine as they are to this boy's roller skates. In fact, whether you go by car, bus, bike, or scooter, you're really travelling on ball or roller bearings of steel.

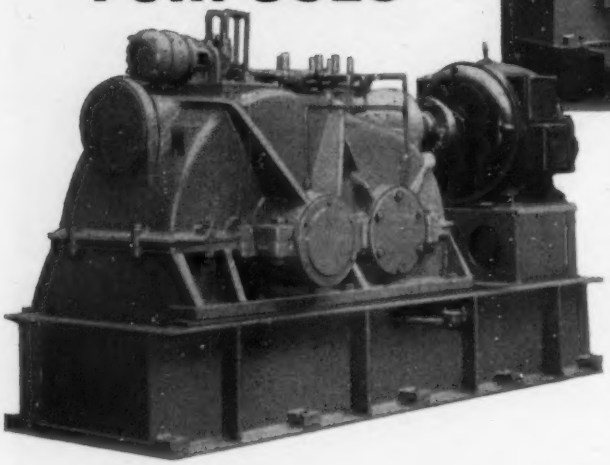
And not only bearings, but axles, wheels, chassis and bodywork pressings of most of our vehicles are made of steel. This is where steel's versatility comes in: ball bearings are usually made of carbon chrome steel or nickel molybdenum steel — in either case, heat-treated to give an extremely hard surface with very high resistance to wear. Car body pressings, on the other hand, are made of low-carbon mild steel, which has the ductility needed for deep-drawing in the pressing process. Steel, in one or other of its many specifications, is the material on which our whole technology depends.

If steel cost ten thousand pounds a ton it would probably be known as a 'miracle' metal. But as it's so inexpensive and plentiful it often goes unnoticed. Steel quietly gets on with its job of making our life run more smoothly.

THIS IS THE STEEL AGE

BRITISH IRON AND STEEL FEDERATION

GEARS ..FOR ALL PURPOSES



UNDER CONSTRUCTION

The 42" × 108" Blooming and Intermediate Mill, shown under construction in the Bridgeton Works, Glasgow, of Davy and United Engineering Company Limited (a member of the Davy-Ashmore Group) has now been installed at the Stockbridge Works of Samuel Fox & Company Limited, Branch of the United Steel Companies Limited, as part of a large-scale extension scheme. It will deal primarily with quality steels, producing a wide range of blooms and billets, and will be capable of rolling to a very flexible programme.

The gearing, supplied by STONE-WALLWORK, is totally enclosed running in oil, and comprises a high-efficiency worm gear, combined in one casing with machine-cut spur or helical gears. The latter is divided into two distinct gears, one on each side of the worm wheel. The whole representing a compact and symmetrical arrangement which ensures an even distribution of the loads between the bearings and gears.

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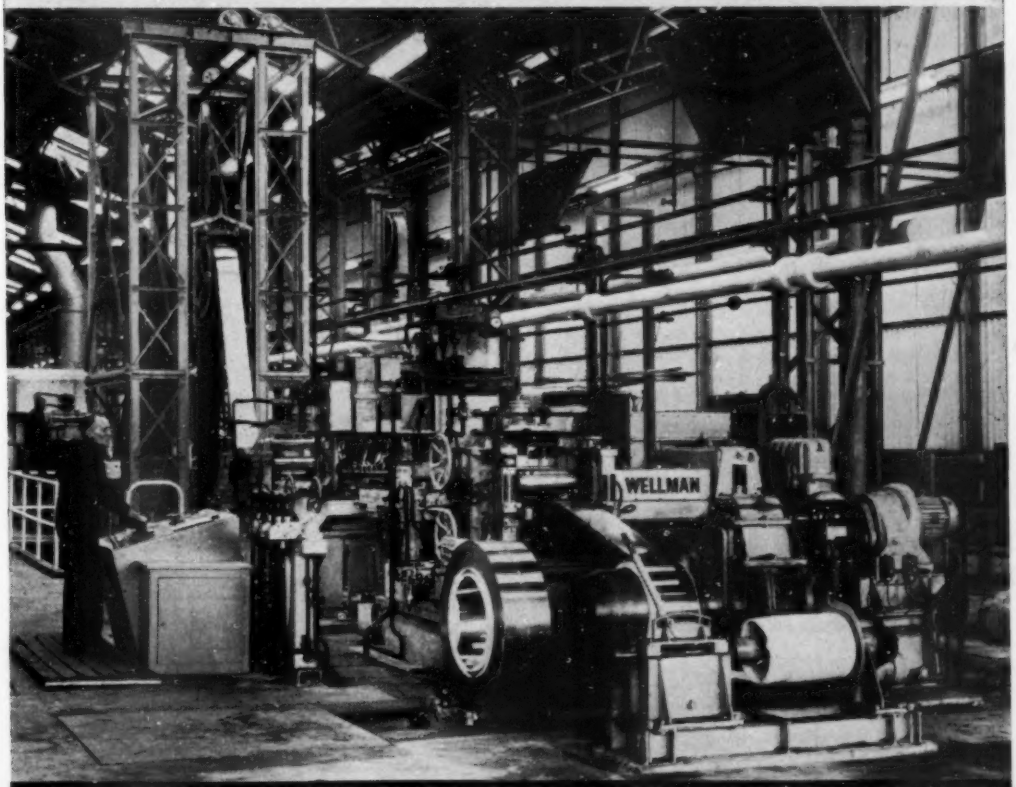

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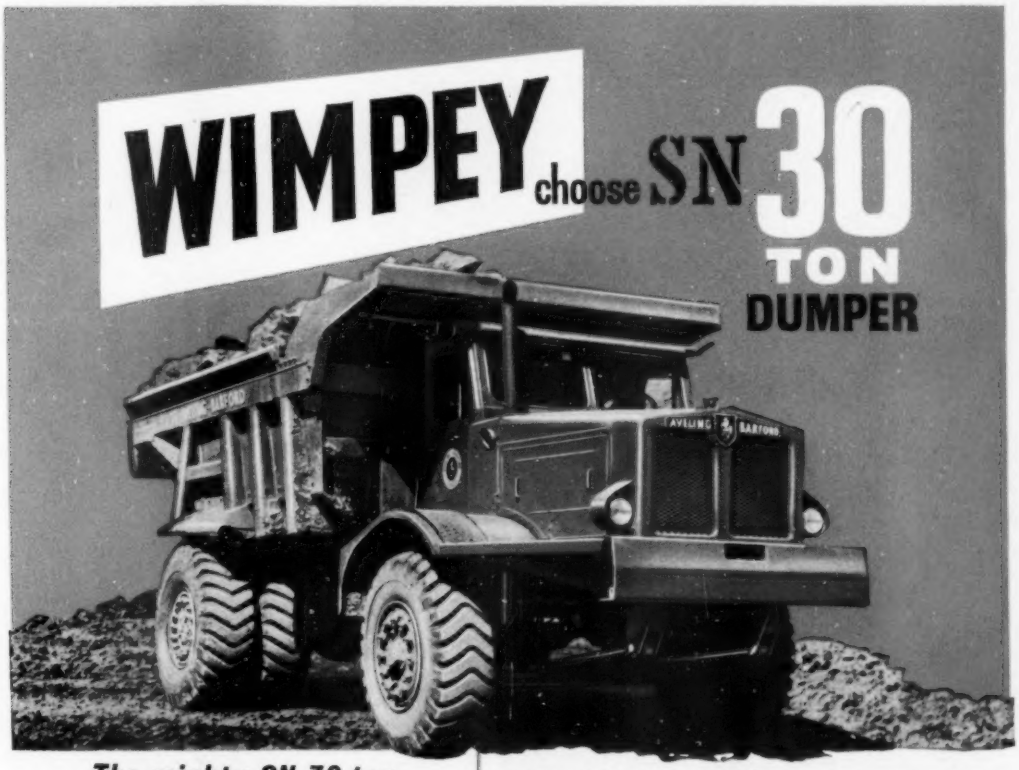

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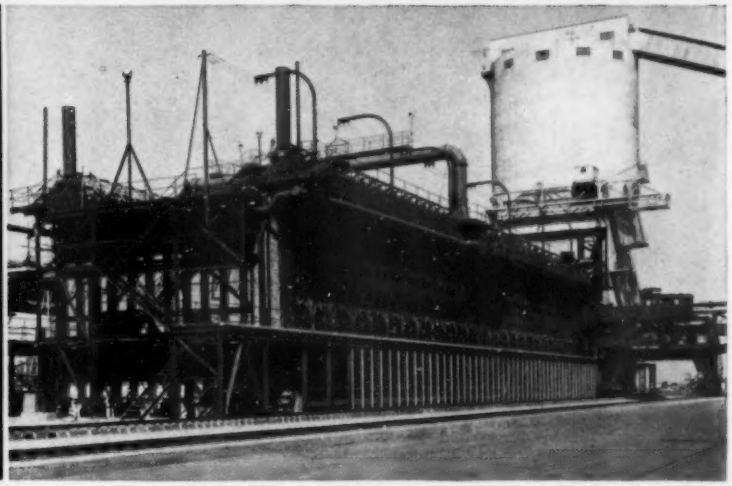

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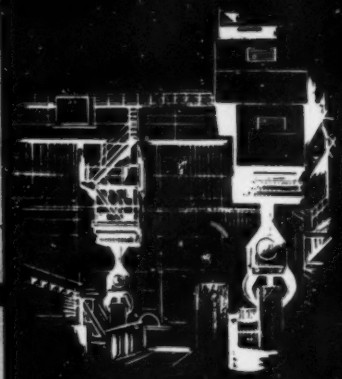

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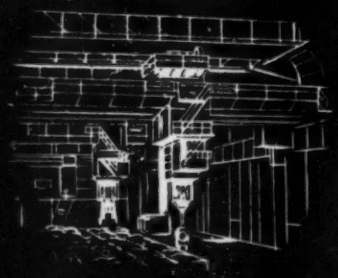

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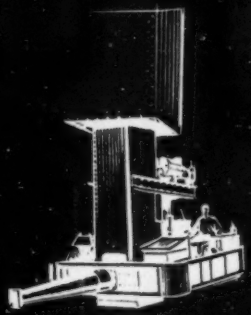

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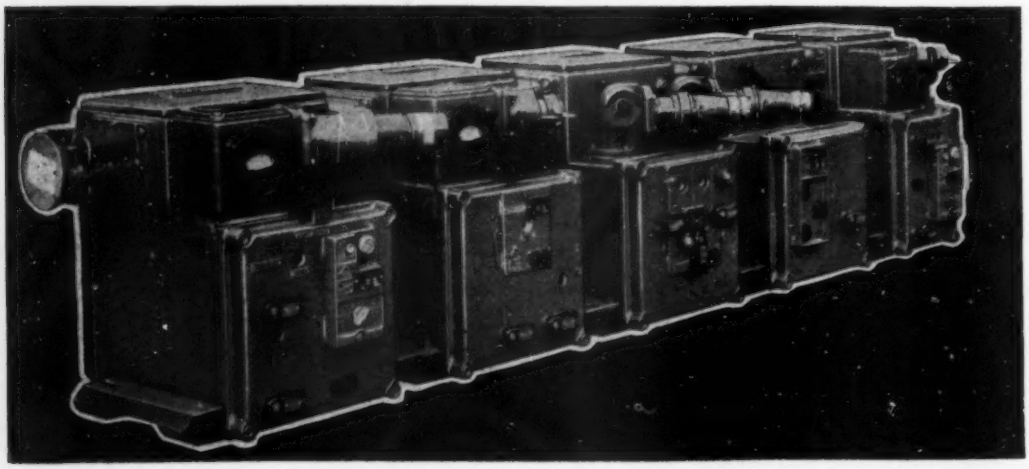

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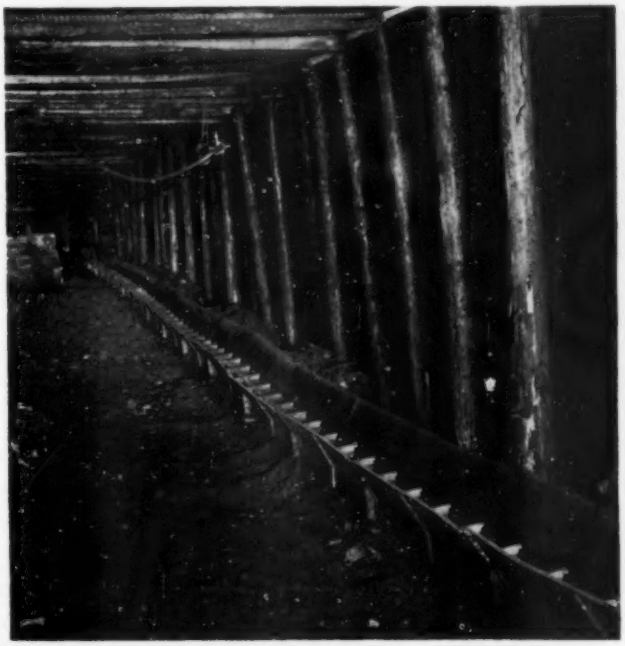

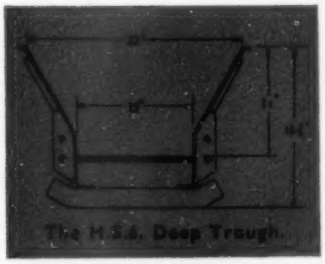

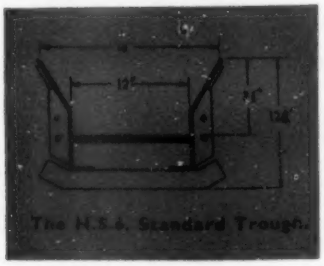

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Vol. 183
No. 4864

IRON & COAL
THE IRON AND COAL TRADES' REVIEW

OCTOBER 6, 1961

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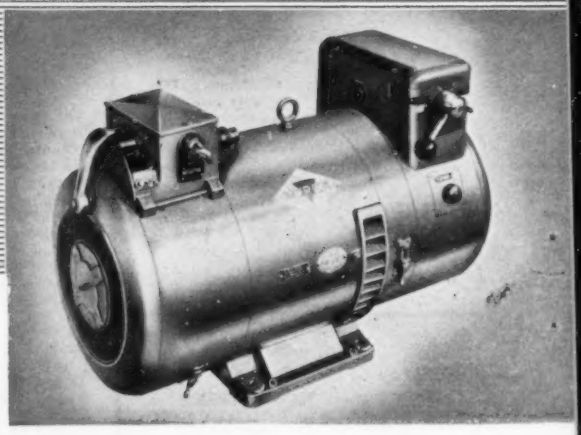

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IRON & COAL
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Vol. 183 October 6, 1961 No. 4,864

Coal's "Proper Place"

IN a booklet published recently by the British Coal Exporters' Federation it is urged that coal "be brought into its proper place in public understanding and esteem regardless of the political views of the Government of the day on the principle of nationalization."

The feeling contained in this sentence might have been better expressed, for if criticism of the Government is not consciously implied, such criticism will certainly be seen by inference by most readers of the booklet. It carries the suggestion that the present Government allows its political views to influence its policy in relation to the coal industry. If Britain's coal exporters really believe that, they had plenty of room in their 12-page pamphlet to provide the evidence. That the Conservative Government allows political bias to influence its attitude to the coal-mining industry has often been suggested by members of the Opposition party; has, in fact, been put forward more than once in advocacy of non-co-operation by the mining community. The Government may have made mistakes in its approach to the fuel problems of the nation in general and the problems of the coal industry in particular, but there is no evidence of an undue obtrusion of political views anywhere in its actions in regard to coal since it took over the responsibility for the industry from the nationalizing administration, and it is only fair to say so.

Perhaps the federation is accusing the Government of acts of omission rather than commission. It goes on to say: "The Government is empowered by statute to ensure that the coal industry is operated in the national interest. The federation believes it should take equal care to make sure that the nation takes a proper interest in the operation of its coal industry." To this sentiment everybody concerned with coal, be he producer, administrator, or trader, will accord a heartfelt "Hear, hear!" The British Coal Exporters' Federation puts its finger on what is perhaps the greatest and most stubborn of the many problems which today confront the industry.

Over the years coal has been constantly in the news, and seldom has the news been good. The public memory in relation to coal, like the memory of too many of the miners, is too long. It stretches back to the aftermath of World War I. It covers the 1921 coal strike and the general strike of 1926, which ruined our export trade. It embraces the internecine warfare between miners and coal owners between 1926 and 1939. It recalls the ups and downs of the industry during World War II, and the shortages and restrictions and the humiliation of imports of the post-war years. When control —unnecessarily prolonged—was finally lifted in 1958 the public fondly thought that its coal troubles were over, that coal was at last out of the headlines for good, and that there would in future be plenty of excellent fuel available at reasonable prices, produced by well-paid miners working contentedly in a nationalized industry.

Unfortunately, things have not worked out quite like that. The man in the street feels that if they are not quite like they used to be the pattern is still distressingly familiar. True, we are out of the times of acute overall shortage and instead are blessed with a plentitude of coal which it is not easy to sell. An ungrateful railway system turns away from the coal which was its lifeblood, and the wicked industrialist spurns the coal for which he once clamoured and instead buys oil, which he says is cheaper and suits his purpose better. The householder, told about the millions of tons of unsold small coal which he could not use short of erecting his own power station, puts in his order for 5 cwt. of best coal in the depth of winter and is resentful if he does not get delivery the next day. Increasingly, indeed, he is being told to forsake coal in the interests of clean air, and is bewildered when his protests to the local council that he cannot get the smokeless fuels it recommends are met with bland indifference.

Bring coal "into its proper place in public understanding and esteem" and a lot of the troubles of producers and distributors would disappear overnight. How to get it into that position is the problem, and it is one to be tackled with energy by the industry as a matter of urgent importance. The Government certainly could help. It will not be an easy task to rehabilitate coal in the minds of the people, but it can and must be done. The industry has somehow to erase from public memory remembrances of the past, and if, as the British Coal Exporters' Federation would seem to suggest, there are lingering doubts about nationalization in the mind of the Government they must be erased too, for whatever may happen elsewhere nationalized coal is with us, and has got to be made to work—in the interests of the Government, the industry, the nation, and the public. The coal industry needs to be allowed to bury its dead past. It is an industry with a turnover approaching £1,000,000,000 a year and gives employment to hundreds of thousands of people. It still provides the vast bulk of the fuel and energy requirements

of this country. It will be a key industry carrying enormous bargaining power when negotiations begin on joining the European Economic Community.

To Britain its coal industry is real money in the kitty. It is a great pity that coal has come to be regarded in some quarters as the nigger in the woodpile of British industry as a whole, that its beneficent virtues in the home as a comforter of the sick, the solace of the old, and the joy of the young should be lost sight of in a welter of misunderstanding and discontent. The public image of coal is too often distorted by the mirror of misconception. The industry must strive to remove these misconceptions and misunderstandings, and form in the public mind the right image of an industry created by and anxious to serve the community and the nation. The need is urgent; the reward could be great.

COAL BOARD'S SURPLUS FOR FIRST HALF OF YEAR

Half-yearly statistical statement of the National Coal Board shows that the board made a profit of £23,338,000 in the first half of the year. After interest payment of £20,738,000, there was an estimated surplus of £2,600,000. Last year there was an estimated deficit of £6,902,000 in the first six months.

The statement shows that the profit was £19,402,000 in the first quarter of this year and £3,936,000 in the second quarter. Details of the statement appear on p. 755.

Brora Pit Offer Before Creditors' Meeting

MEETING of creditors of Brora Coal & Brick Company, Limited, will be held in Edinburgh on Monday, and among subjects to be discussed will be an offer from the Highland Fund, Limited, on behalf of miners, to purchase the pit and briquetting plant at Brora (Sutherland). The pit and brickworks closed down when the company went into liquidation.

The company was formed in 1949 by Sir David Robertson, MP, when the pit was threatened with closure by the National Coal Board. Later he opened a briquette plant and brickworks. The closure of the pit has meant a loss to Brora of weekly wages totalling £600.

ORE DISCHARGING PLANT at Tyne Dock operated by the Tyne Improvement Commission began on Monday to operate only one daily shift of eight hours, after two years of double shift working totalling 16 hours a day. The reduction in activity reflects the recent run down in work at the Consett Iron Company, Limited, which takes all the ore imported through the plant.

Coal Output Record by Notts Area Pits

NEW landmark in British coal production was reached in September when for the first time ever the average overall output for a group of pits exceeded 50 cwt. per manshift, against the national average of about 28 cwt. The record was achieved by nine pits in the No. 6 (Nottingham) Area of the East Midlands Division of the NCB, which employs 12,500 men. It is stated by the Coal Board to be the highest productivity ever recorded in a British coalfield, and is believed to be a record for any unit of comparable size in Europe. During September, the division as a whole achieved a record output per manshift of 44 cwt.

A telegram of congratulations to management and men in the No. 6 Area on their achievement was sent by Lord Robens, chairman of the NCB, which said: "This sets a standard at which the industry as a whole must aim and I know that you will continue to strive to improve even on this outstanding performance."

No. 6 Area pits have more than doubled their saleable output of coal to more than 6,000,000 tons a year in the 14 years since nationalization of the mines. Three out of every four tons of coal mined in the Area are won by power-loading machines, and output is scheduled to rise further by 1965 because of the growing demand for coal at power stations. The nine producing pits in the Area are Bestwood, Wollaton, Radford, Clifton, Babbington (Cinderhill), Gedling, Linby, Hucknall No. 1 and No. 2, and Calverton.

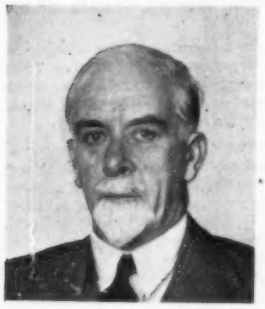
Mr. W. L. Miron, chairman of the East Midlands division, in a congratulatory message to all employed in the Area, pointed out that another of the division's Areas—No. 7 (Leicestershire and South Derbyshire)—was in 1948 the first Area in the country to achieve an output of 40 cwt. per manshift. "These figures of outstanding productivity demonstrate the strength and progress of the division, and its increasing contribution to the coal industry," he said.

Dr. Beeching's Drive to Move More Coal by Rail

ALL staff of British Railways have been urged in a personal message from Dr. Beeching, chairman of the British Transport Commission, to make a big effort to carry all the coal traffic on offer to rail this coming winter. The message reads: "Never before has it been so necessary for us to attract to rail all the goods traffic which we can get. The best of traffic is coal and yet for the past two winters we have had to divert coal from rail to road and pay for doing so because we were not able to carry it all ourselves.

"This winter we shall have a chance of taking more coal than we have moved in recent years. We mean to carry every ton that is offered. This will involve carrying about 3,500,000 tons a week, compared with last winter's best of 3,000,000 tons. In other words we must clear an extra 10,000,000 to 12,000,000 tons over 20 winter weeks."

Dr. Beeching says that this will mean, among other things, avoiding the hoarding and over-ordering of wagons: "They must be moved and cleared quickly and sent back to where they can earn money by being loaded with more traffic."



SIR ANTHONY BOWLBY

Record Year for BSI

MANY NEW STANDARDS

MR. G. CUNLIFFE

PAST year has been another one of record activity and output for the British Standards Institution. For the first time, the number of new and revised British Standards published topped the 300 mark, and sales of British Standards in 1960-61 rose to 1,158,000, compared with the previous record figure of 1,097,000 in 1959-60, about a quarter going oversea. Mr. Geoffrey Cunliffe, managing director of Norcros, Limited, the industrial holdings company, was last week elected new president of the BSI, and Sir Anthony H. M. Bowlby, a director of Guest, Keen & Nettlefolds, Limited, and joint managing director of Guest, Keen & Nettlefolds (Midlands), Limited, was appointed chairman of the BSI's engineering divisional council.

The report of the BSI, presented at the annual meeting last week, says that international standards activities have made increasing demands during the year as also has work on testing and approval of products, and there was a sharp increase in the amount of new work added to BSI's already large programme.

A large increase in financial resources is needed, it is stressed, if the BSI is to meet efficiently the demands made upon it. If this increase is not forthcoming, it might have to introduce a much more rigorous system of priorities, possibly with special emphasis on the needs of the major exporting industries.

Standards in Europe

During the presentation of the report, the increasing scale of international standards work and the importance of Britain playing a full part in it was stressed. It was likely that activity in connection with unification of standards in Western Europe would expand, particularly if the United Kingdom entered the Common Market.

In the past year there had been a growing interest in, and demand for, stringent safety standards. The establishment of the British Electrical Approvals Board also reflected an increased awareness on the part of manufacturers of the need, in their own interest and the consumer's, to discourage in every way possible the sale of unsafe appliances.

Another feature of the past year had been BSI's growing efforts to help in the efficient application of standards in individual firms. BSI's main task of preparing standards could only be carried out effectively if it was in close touch with the standards departments of manufacturing firms and large purchasers. The establishment of a "Register of Standards Associates" had provided a useful link and had also made easier the exchange of information and experience among those responsible for the standards policy and procedures in individual firms.

In the engineering division, three new industry standards committees had been set up—on nuclear energy, data processing, and surface coatings. The new uses to which materials were being put had called for fresh study of the treatment on surfaces and similarly the stresses placed on materials by recent designs had called for a reassessment, notably of the materials used for pressure vessel fabrication.

Among the codes being developed under the Council for Codes of Practice were those for precautions against fire in all types of buildings, for protection of steel against corrosion, for composite construction in steel and reinforced concrete, and for the earthing of all types of electrical equipment.

Mr. Cunliffe succeeds as president Mr. R. E. Huffam, who has been elected a deputy president. Mr. Cunliffe had earlier been elected chairman of BSI's general council. Mr. John Ryan, vice-chairman of Metal Box Company, Limited, was re-elected a deputy-president, and Mr. A. D. Bonham-Carter, UK co-ordinating director of Unilever, Limited, succeeds Mr. Cunliffe as chairman of BSI's finance committee.

Among those elected to serve on the BSI general council were: Mr. E. J. Cook (Richard Costain, Limited); Mr. H. A. Pursey (Turners Asbestos Cement Company, Limited); Dr. L. Pfeil (International Nickel Company (Mond), Limited); and Mr. J. H. Wilder (John Wilder, Limited).

AGREEMENT has been signed by Craven Bros. (Manchester), Limited, machine tool makers, with John Bertram & Sons, Limited, of Dundas, Ontario, under which it will supply designs, specifications, and lend technical assistance to the Canadian company, which will be free to offer for sale in Canada and the US, Craven machine tools built at Dundas or imported from Britain.

Passing Thoughts . . .

AS an industrialist, words fail me in expressing my opinion of our political masters. I am a Tory, always have been and probably shall die a Tory, but it seems to me that those at the top are living not in the clouds but right above them, so high that they cannot even see their own feet. The present rates of taxation are unrealistic, except for paying out to meet expenditure which any businessman would cut when he could not afford it. Do they realize the intense feeling of frustration in all of us in responsible positions? Why not incentives, for example an easing of taxation on exports? More carrot and less stick!—MR. J. E. V. JOBSON, chairman of Qualcast, Limited, in his annual report to shareholders.

The analytical bluntness of Lord Montgomery; the unflappability of Macmillan, the serious dedication of Frank Cousins; the roguish humour of Lord Boothby; and the basic common sense of the man in the street.—Qualities of leadership listed by MR. JOHN MARSH, *new director of the British Institute of Management and former director of the Industrial Welfare Society.*

Our profit in differential is estimated and determined by the Iron and Steel Board and is little enough even at the top figure allowed. If our industry is important enough to be controlled it should be so substantiated and acknowledged suitable in profitable consideration. Let that stand as written.—MR. RONALD HAMPTON, chairman and managing director of the Union Steel & Manufacturing Company, Limited, in his annual review.

There are signs, from the utterances of some trade union leaders, that they are as afraid of progress as their members.—Nottingham Guardian Journal.

There are reasons for thinking that the whole field of labour relations needs to be overhauled in the light of modern conditions. This is not to say that there are not firms, and indeed industries, in which great improvements have been made. It is certainly more widely appreciated than it used to be that it pays management to improve the conditions and morale of their employees.—SIR ROBERT HALL, until recently Economic Adviser to the Government, writing in the Economist.

And so while the Great Ones repair to their dinner
The Secretary stays growing thinner and thinner,
Racking his brains to record and report
What he thinks they will think that they ought to have thought.—Quoted in "Standard Boardroom Practice," a new publication by the Institute of Directors.

As you go about your daily duties, your walk to work, your household chores, pause and reflect that in many places half a mile below you are men toiling at their job and going to and from their work. There's food for thought there, and an understanding perhaps of some of the human problems which occasionally blow up at the pits.—Doncaster Chronicle.

The [Saturday working] agreement is an illustration of good industrial relations that could with advantage be extended.—The Scotsman.

I agree . . . that to transport coal by road to London is ridiculous. . . It is to be hoped that a ban on all loads over five tons will be put on road traffic in order to enforce the rightful use of the railways again. . . This would also allow the ordinary motorist the proper use of the roads . . . without being blinded by coal dust on the journey.—Letter in the Western Mail.

While relieved by the evidence of an upturn in the demand for coal, we hope that Saturday shift working will not be necessary. The objective must be to get all the coal needed in a five-shift week.—Newcastle-upon-Tyne Journal.

In my view they [the workers] should have responsibility right up to the boardroom. If industry will not give workers their proper status it is up to the Liberal Party to change the Companies Act to see that their status is recognized. . . . I want to get to the stage where the workers in British industry genuinely feel that they employ the managers and are consulted at every stage of the industrial process.—MR. JO GRIMOND, Leader of the Liberal Party at its annual assembly, in Edinburgh.

United Steel Scholarships

FOLLOWING a final selection board held in Sheffield, at which a short list of 20 candidates was interviewed out of a total of 201 applicants, the United Steel Companies, Limited, has awarded five university scholarships. They are tenable for three or four years and are to the value of £500 per annum, free of tax. It is intended that they should provide industrial as well as academic training, and arrangements will be made for the successful candidates—who are listed below—to receive industrial experience with the company.

This is the second annual award of United Steel scholarships, five having been awarded in 1960. Those successful were:—J. S. Briggs (Thornes House School, Wakefield), Manchester University; B. Cheetham (King Edward VII School, Sheffield), Corpus Christi College, Oxford; R. A. Herbertson (Magdalen College School, Oxford), Corpus Christi College, Oxford; L. M. Jones (Oswestry High School for Boys), Trinity College, Cambridge; R. M. Sainsbury (Sherborne School), Corpus Christi College, Oxford.

London Exhibition on Corrosion

EXHIBITION on "The Fight Against Corrosion," to be held at Londonderry House, 19, Park Lane, London, W.1, on Tuesday, Wednesday, and Thursday of next week, is announced by Henry Wiggin & Company, Limited. Corrosion in all its forms is alleged to cost the country up to £600,000,000 per year in lost production, maintenance, and material replacement. The answer to the problem is met in the right choice of material for the task or for the construction of the plant.

The exhibition describes the different types of corrosion, how they arise, and gives information on factors affecting corrosion and the resistance of Wiggin materials to the more common corrosive substances.

Short Time in Sheffield Steel Industry

DESPITE the fact that the number of short-time workers in the Sheffield steel industry had risen by over 1,000 since work was resumed after the summer holidays, it was much too early to think the deterioration would reach the 1958 recession figure, Mr. R. T. Downham, Employment Exchange manager, told Sheffield and District Employment Committee on Tuesday.

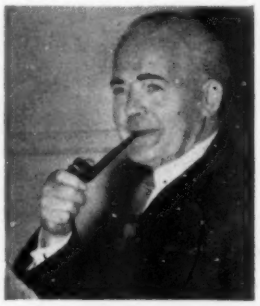
The short-time working existed at eight establishments, but the large majority of people affected were classed as unskilled workers.

CONFIDENCE IN COAL

Parliamentary Secretary on New Enthusiasm

"NEW leaders can create new moods, and, I believe that the enthusiasm and energy of the new chairman of the NCB are, in fact, creating a new mood in the coal-mining industry. It may be difficult to discern today, but I believe it is germinating. This new mood, this new spirit of confidence must be fanned and encouraged by all who wield influence in the coalfields. Prophets of gloom are a menace to the industry. Far from coal being on the way out, my view is that it is preparing for a vigorous bound forward."

Mr. John C. George, Parliamentary Secretary to the Ministry of Power, who made this optimistic statement at the first luncheon of the 1961-62 season of the Coal Industry Society, in London on Monday, has, in the past, been a redoubtable critic of the industry.



MR. J. C. GEORGE

However, he could never be accused of being a destructive critic, and since he became a junior minister, he has been one of the industry's and the National Coal Board's stoutest champions. Lord Robens, chairman of the NCB, sat within a few feet of Mr. George on Monday and heard him say: "I believe we have, in the present chairman, a man who can—if anyone can—win this, the most vital battle of all—the battle for peace in coal. . . . We have men of vision and vigour in charge of operations, and the fate of coal in the 60s is in their capable hands."

Promise of the 60s

Speaking of the promise of the 60s, Mr. George contrasted the present with the 50s—a decade which began with a scramble for output and ended with a gigantic surplus, when costs and prices rose and the board's deficit grew to £78,000,000; when oil emerged as a bitter and ruthless competitor, and manpower in the industry fell. But, he reminded his audience, the 50s planned and largely completed the reconstruction of the industry. It was now the board's task to utilize this vast investment successfully and efficiently to solve the problems of the 60s.

The most urgent problems seemed to be:—To increase productivity to meet the new obligations imposed by the White Paper; to become, and remain, competitive without general price increases: to stop the fall in manpower and reverse the trend; and to increase the output to meet all demands without the assistance of stocks.

In the coal-mining industry some of the new sinkings were causing concern and might not have the length of life expected. The reserves to be accumulated would provide for premature obsolescence. It was also felt that the boards could make a more substantial contribution out of their own earnings towards the cost of their capital development and discussions were going on to fix targets for the first five years, stated in terms of a percentage return on capital employed. Certain new price freedoms would be given to the boards.

Mr. George felt these new disciplines would undoubtedly cause the NCB to have a new look at its accounts for the 50s. In that decade, before charging interest Scotland lost £78,000,000, South-Western Division, £29,000,000, North-Western Division, £27,000,000, and Northern (N&C) Division, £12,000,000, respectively. Last year only three divisions showed an operating surplus. It was evident that if these losses could be stopped or reduced substantially the board's financial position would be transformed and the industry's competitiveness greatly improved.

An increase in productivity was the objective of every division, but in some divisions, it would seem impossible to cure the losses in this way. The industry had applied a self-denying ordinance with regard to general price increases, for a period at any rate. In any event, this method was too simple, and contained serious dangers. A general price increase was applied to both profitable and unprofitable divisions, and could cause the prices in profitable divisions to rise so high as to lose customers unnecessarily. It would, therefore, appear that, in addition to cutting losses through raising productivity, in some cases revenue might have to be obtained locally.

The Minister acknowledged that nothing was more demoralizing for both men and management than to know their efforts year after year were resulting in a loss and nothing would do more to restore confidence at every level than the elimination of the losses and the emergence of a profit.

Its energies were concentrated upon raising the level of productivity quickly and substantially. Increases had been shown over the last four years and 1961 would show a further increase—probably 2½-3 per cent. "But productivity is not rising fast enough," said Mr. George. It had been calculated that nothing less than 4 per cent. per annum would meet the rising charges, and, to be safe, 5 per cent. was desirable.

Asking whether it could be achieved, Mr. George said that by 1965 80 per cent. of all production would come from new or reconstructed pits. The remaining 20 per cent. were either highly efficient, or would die out and be replaced. Therefore, at least in the mid 60s, there would be virtually a new industry, designed and equipped literally regardless of cost, on the best mining techniques in use across the world. Within the industry, mechanization underground had been proceeding apace throughout the 50s. Last year, 91 per cent. of the country's coal output was mechanically

cut against 74 per cent. in 1946; 95 per cent. was mechanically conveyed against 73 per cent. in 1946.

Great impetus was being directed towards power loading, which accounted for 38 per cent. of the production last year, compared with only 2 per cent. in 1946. In addition, the greatest mechanization drive ever undertaken was in progress, and 1961 should enjoy the advantage of an additional 400 power loading machines. The board intend to exert maximum pressure to reach the target of 80 per cent. power loading swiftly.

The 60s were likely to have the benefit of new tunnelling machines, and new machines to do road ripping at the face and outbye. OMS—the best yardstick of measurement—had risen from 24.6 cwt. in 1957 to 29 cwt. this year, and the target for 1965 was 31 cwt.

A New Industry

This promising picture—virtually a new industry, equipped with the best machinery available, mechanization expanding swiftly, productivity rising, manpower falling—did it really mean what it appeared to say? It would be a miracle if the 80 per cent. of new and reconstructed capacity were to be wholly successful. He thought the picture would be:—A few complete failures, but the greatest proportion would provide something like the results expected. Therefore, the proportion of new capacity making the expected contribution to national results would be something less than 80 per cent.

Mr. George had no illusions about the future. Almost all of the new and reconstructed undertakings had taken longer than planned to bring to production and had to bear a heavy burden for depreciation and interest and in so far as they did not reach their original targets, that burden would be the more crushing; there were bound to be rising charges for wages and other benefits; a rising proportion of total coal output would be diverted to electricity and would bring a lower price; and competition, which would sharpen, could only be met by a careful use of the price mechanism.

All this, he believed, seemed to say that the targets set for 1965 were not high enough and ways and means must be found to raise productivity beyond the 31 cwt. Power loading on the old methods would not give the results as machines were not worked enough hours per day and power loading was restricted by the need to produce large coal for domestic purposes.

A revolution in mining practice was in train to overcome the first of these handicaps. The aim was to have the minimum number of faces working the maximum number of hours per day, producing high outputs with a high OMS. By this means, a high load factor could be obtained from the machines, haulages, and shafts, and the success of this new practice could be the salvation of many of the new collieries bearing a high rate of depreciation. Success could also solve another problem. Output was still falling, stocks were dwindling—by 1963, they might be as low as prudence would dictate. If the NCB chairman's objective of 200,000,000 tons was attained, a substantial rise in deep-mined output must be obtained within two years. Some progress had already been made, and this was the key to the future prosperity of the industry.

Mr. George felt that ways and means must also be found to eliminate the need to produce large coal and the solution might be found in the success of the NCB's pilot plant at Birch Coppice. It would take time and capital, but complete liberty to work modern power-loading machines to their full capacity wherever they could be installed would lift the OMS above the targets now set.

With reasonable success along the new lines there was the prospect that the industry could be prosperous and competitive, rewarding both men and management on a standard which employment in this industry merited. But the task would not be easy; no other industry in the country produced so many headaches, challenges, and disappointments, but the vigour with which the need for higher productivity was being tackled gave confidence that the battle would be won.

Finally, the Minister spoke of manpower—the master key to success—not only in numbers, but in the spirit the men brought to their task. It was vital to have the right numbers of men in the right place at the right time, but manpower was now out of balance. There cropped up, here, the problem of housing. The last problem was perhaps the most difficult—good relations between the board and its men. The right spirit was evident in many parts of the country, but in other parts—generally where working conditions were difficult and uncomfortable—relations had not been so good. He would be the last to forecast that peace and co-operation could be easily or quickly attained but he believed that in Lord Robens they had a man who could win the most vital battle of all—the battle for peace in coal.

Durham NCB Coal Sales Exceed Output

SALES of coal exceeded production and stocks continued to decrease in the Durham Division of the NCB during the past year, Dr. William Reid, chairman of the divisional board, told the nine Durham MPs last week. In the past year sales exceeded production by 1,250,000 tons.

Dr. Reid said an increasing amount of Durham coal was being taken by electricity boards. This year the total absorbed by this market was expected to be about 4,000,000 tons, compared with the 900,000 tons in 1956. The figure was expected to climb still higher, especially as it was hoped that at least one new power station would be built in the county. The recession in the steel industry, however, had resulted in a considerable reduction in coal requirements. "This is serious for Durham because the steel industry takes coking coal from the western part of the county," Dr. Reid said.

Some of the MPs afterwards went to Wearmouth to see one of the county's developing coastal collieries and the remainder inspected Tursdale training centre and workshops.

QUALCAST, LIMITED, light repetition steel and iron-founders, of Derby—Order books are satisfactory and the proportion of products exported continues to grow, states Mr. Vincent Jobson, chairman, who adds, however, that he cannot give a forward forecast because of the disturbed international picture. All previous figures were beaten in the year ended June 30, 1961, when group profits, before tax, increased by £100,041 to £1,411,824. The chairman says it has been the intention of the board to recommend an increased dividend, but it decided to follow the Chancellor's request for restraint.

The Common Market

ENTRY FAVOURED BY NEW MASTER CUTLER

IF Britain's entry into the Common Market was agreed on proper terms there was much to gain and little to fear, said Mr. Gerard Young, chairman of the Tempered Group, Limited, at his installation as 338th Master Cutler at Sheffield on Tuesday. Urging specific attention to design and salesmanship, Mr. Young said that Britain would need great strength when it and most of Europe became one continental market and present tariff barriers disappeared.

Misgivings about the pace of this development both in the Commonwealth and at home could easily be understood, but this country could lose as much by hesitation now as it stood to win by joining. If the UK were to pay its way we must learn to do without the soporifics of present tariff walls and State supports.

In the nation's whole economy, too many of the 24,000,000 workers were inefficiently employed, but the well-run farms and factories had little to fear and much to gain from Common Market entry.

Can Compete with Confidence

Mr. Young said that in most technologies of manufacture we had the latest "know-how" to enable us to compete, although some firms had been slow to innovate. We could compete with confidence if and when our men and management really tried. Industrially the great attraction of the Common Market was in its pace of growth. Europe, if brought into alliance with the British Commonwealth would surpass in economic strength and population, China, Russia, or the US. It could again become Britain's destiny to be recognized as leader of both Europe and the Commonwealth.

Turning to domestic affairs, the new Master Cutler said that most Sheffield firm's order-books seemed to be pretty full, but the overload and overtime in many works had disappeared. In steel an upturn of even a levelling out of the decline in overall demand was anxiously awaited as working shifts per week were being reduced. The sombre patches were largely offset by full activity in other trades, such as heavy road vehicles, aero engines, and machine tools.

Assurance of Nickel Supply by Inco President

PRESIDENT of the International Nickel Company of Canada, Limited, Mr. J. Roy Gordon, assured stainless steelmakers in Sheffield on Tuesday that there would not be another nickel shortage. Stockpiling of nickel by Western governments which led to nickel shortage has hampered Sheffield's post-war development of stainless steel.

Mr. Gordon, accompanied by Mr. A. P. Gagnebin, a vice-president of Inco, had visited various firms in Sheffield which are prominent in the stainless steel field. At a reception at the Royal Victoria Hotel, a film was shown of the building of the new Thompson plant in Manitoba, Canada, which is designed to give 75,000,000 lb. extra of nickel a year, and is already working beyond that capacity.

Ore Chartering

ALTHOUGH markets are not particularly active, the undertone is generally steady, and in certain cases owners have been able to make some improvement in freight rates. Some activity has been noted from Marmagoa, 9,500 tons having been fixed to Holland Weser Range at 40s. f.i.o.t. with 2,000 tons load for October 2-23, 10,000 tons to Tobata or Yawata at 49s. also f.i.o.t. for November 1-31 and 9,500 tons to West Italy at 38s. f.i.o.t. for October loading. Demand is maintained. Chili/Rotterdam reports 20,000-tonner at $6.85 f.i.o. for October.

West African chartering is slow to develop and Pepel/Antwerp Hamburg Range recently paid 28s. 6d. for 14,500 tons prompt with interest maintained, but the smaller sizes are apparently scarce with owners anticipating firmer rates. Very little ore chartering is reported from the Mediterranean area to the Continent and the present demand appears somewhat limited. Bauxite has been fixed from Toulon/Newport for 9,500 tons November 10-25 at 22s. with prospects for forward loading and 3,800 tons of residues from Almeria/Barrow at 26s. for October shipment. Pasajes/Rotterdam reports 4,900-tonner at 19s. f.i.o. There is some miscellaneous inquiry from the North Spanish ports.

In the phosphate section a 9,000-tonner has been taken from Saffi/Rijeka at 28s. but Casablanca/UK has nothing of particular interest to report. The latter remarks also apply to pyrites from Huelva either to this side or to the Continent.

Amalgamation of Owen & Dyson with Steel, Peech & Tozer

ON Saturday, the assets and liabilities of Owen & Dyson, Limited, were transferred to the United Steel Companies, Limited. The business of Owen & Dyson is now being undertaken by the Steel, Peech & Tozer branch of United Steel and the new department thus created will be known as the Fullerton machine shops.

Owen & Dyson was formed in 1874, though its antecedents go back to 1823. It was originally engaged in the production of cast-iron and later forged railway wheels, becoming a private limited company in 1909. There has been a close association with Steel, Peech & Tozer since soon after the first world war. Railway wheel production ceased about 30 years ago, and thereafter Owen & Dyson concentrated on machining and assembling the wheels, tyres, and axles made by Steel, Peech & Tozer. The company became a wholly-owned subsidiary of United Steel in June, 1955.

Personal

Tributes to Davy-Ashmore Chairman and Director

TRIBUTES were paid at the annual meeting of Davy-Ashmore, Limited, to the retiring chairman, Mr. D. F. CAMPBELL, and to Mr. W. R. BROWN, formerly chairman of the Power-Gas Corporation, Limited, who also retired from the board, for their service to the company. Mr. Campbell joined the board of Davy Bros., Limited, in 1935, and became chairman in 1944 when the company had become Davy & United Engineering Company, Limited.

Mr. Brown played an important part in the merger between the Power-Gas Corporation and Davy-United, Limited, from which Davy-Ashmore was formed.

Mr. D. H. DAVIES, British Iron, Steel and Kindred Trades Association, has been elected vice-chairman of the Labour Party.

Mr. JOHN LE GROS, London area sales representative for Guest, Keen & Nettlefolds (Midlands), Limited, has retired after more than 50 years' service with the company.

Director of manufacture on the board of Associated Electrical Industries (Woolwich), Limited, Mr. G. W. GIFFIN retired last Saturday after a 22-year association with the company.

On medical advice, Mr. T. B. MARSHALL is retiring from the board of Frederick Braby & Company, Limited, structural engineers, metalworkers, etc., of London, N.W.1, after 47 years with the company.

Chairman of the Cementation Company, Limited, group, Sir FREDERICK PILE, is on a month's business tour of the US and Canada, where he will visit projects which are being carried out by the group's Canadian and American companies.

Mr. REGINALD ROY HUTCHINGS, deputy works manager at the Bedford engineering firm of W. H. Allen Sons & Company, Limited, retired last Friday, after 37 years with the firm. He became assistant works manager in 1938 and deputy works manager in 1950.

Mr. J. A. KEMP has relinquished his position as a director of Albion Motors, Limited, Glasgow, after 27 years' service with the company. Two years ago he retired from his appointment as chief designer, and since then has served the company as engineering consultant.

A director of the Federation of British Industries and managing director of British Overseas Fairs, Limited, Mr. W. P. N. EDWARDS is to visit Australia this month where he will examine the possibility of staging an all-British trade fair or some other form of trade promotion in Sydney or Melbourne.

Mr. PHILIP FOGG, chairman of the Consolidated Electrodynamics Corporation, Inc., Pasadena, USA, and also vice-chairman of the Bell & Howell Company, Chicago, visited the new Woking headquarters of the recently formed British company Consolidated Electrodynamics Corporation (UK), Limited, last week.

Sir WILLIS JACKSON, FRS, former director of research and education, Associated Electrical Industries (Manchester), Limited, and now Professor of Electrical Engineering at the Imperial College of Science and Technology, has been elected president of the British Association for Commercial and Industrial Education.

Mr. T. M. GRANT, export executive of George Angus & Company, Limited, the Newcastle-upon-Tyne fire, power transmission, and fluid sealing engineers, leaves London on Monday on the first stage of an African and Near Eastern sales tour which will take him to Cairo, Khartoum, Addis Ababa, Aden, Nairobi, Zanzibar, and Mauritius.

Visit to the Sheffield works of the English Steel Corporation, Limited, was paid last week by the Master Cutler, Mr. C. H. T. WILLIAMS, chairman of Park Gate Iron & Steel Company, Limited, who was accompanied by his wife. They were escorted on their tour of the works by Mr. W. D. Pugh, managing director of English Steel Corporation.

Sir BEN SMITH, now 82, who was chairman of the West Midlands Divisional Coal Board from 1946 to 1950, was married on Wednesday at St. Andrew's Presbyterian Church Hampstead, to Miss Gertrude Lacey, aged 56, a cousin of Mr. Frank Salisbury, the portrait painter. Sir Ben's first wife died in 1959 after they had been married for 60 years. Sir Ben was Minister of Food from 1945 to 1946.

North-Eastern NCB Engineering Scholarship Successes

ENGINEERING scholarships of the National Coal Board have been awarded to nine candidates this year, four of them to applicants from within the coal-mining industry in Yorkshire. The successful candidates were:—

B. J. Roughton (Mexborough Grammar School): chemical engineering, Imperial College, London; C. Nussey (Broadway Technical Grammar School, Barnsley): chemical engineering, Leeds University; S. W. Aaron (Grammar School, Barton-on-Humber): chemical engineering, Imperial College, London. A. Kirk, a student apprentice in the No. 5 (South Barnsley) Area and formerly of Barnsley Grammar School: mechanical engineering, Cardiff University; J. R. Hogg (King Edward VII Grammar School, Sheffield): mining engineering, Sheffield University.

J. Stocks (Sowerby Bridge Grammar School): mining engineering, Imperial College, London; P. G. Thompson, employed at Barrow Colliery and formerly at Rotherham Grammar School: mining engineering, Cardiff University; J. Cartwright, employed at New Monkton Colliery and formerly at Hemsworth Grammar School: mining engineering, King's College, Durham; E. Hall, employed at Barrow Colliery and formerly at Ecclesfield Grammar School: mining engineering, King's College, Newcastle.

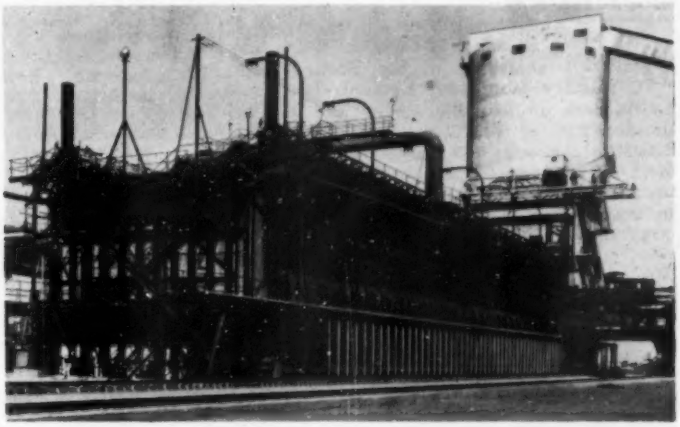
Two awards have been made in the Northern (N&C) Division. They go to D. Richardson (Heaton Grammar School), chemical engineering, King's College, Newcastle; and I. Lewin (Dame Allan's Boys' School), mining engineering, King's College, Newcastle.

Royal Visit Marks Shipyard's 250th Anniversary

VISIT by the Duke of Edinburgh on October 16 will mark the 250th anniversary of Scotts' Shipbuilding & Engineering Company, Limited, Greenock, which was established in 1711. Its present-day chairman, Mr. M. A. Sinclair Scott, represents the seventh generation of the founding family. Prince Philip is to unveil a commemorative plaque in gardens laid out in the centre of the reconstructed shipyard.

Although one of the oldest shipbuilding enterprises in the world, Scotts is also one of the most modern concerns. The company has reorganized its shipyard at a cost of £750,000, and is in process of modernizing its engine and boiler works under a £500,000 scheme which should be completed next year.

NEW COKE OVENS FOR STEWARTS AND LLOYDS



NEW coke oven plant at the Corby (Northants) works of Stewarts and Lloyds, Limited, was officially opened on Wednesday by Miss Mary B. Stewart, daughter of Mr A. G. Stewart, chairman and general managing director of the company. The new plant, built by Woodall-Duckham Construction Company, Limited, will be known as the Deene battery. It is intended to maintain the works coke production at existing level while the three original batteries on the 25-year-old Glebe coking plant are rebuilt in turn over a period of two years. The Deene battery will afterwards form the nucleus of a new iron-making plant.

The carbonizing capacity of the plant is 1,100 tons of coal per day from which some 800 tons of metallurgical coke will be produced. Gas for works distribution will be available at the rate of 11,000,000 cu. ft. per day and the by-product plant will produce tar, naphthalene, and crude benzole, and ammoniacal liquor for the manufacture of sulphate of ammonia.

Woodall-Duckham's contract comprises a single battery of 51 W-D Becker underjet coke ovens with Wilputte self-sealing doors, a pusher machine with hydraulic extractor head, turntable type coal charging car, combined coke guide and door machine with hydraulic head and double collecting mains. The ovens measure 16 in. wide by 13 ft. high by 43 ft. long, and hold 14¼ tons of coal each. They are served by a 3,000-ton capacity storage bunker, which is fed from a 500 ton-per-hour coal-handling plant by a conveyor system. The coal plant provides for coals to be blended and stocked on a pile up to 200,000 tons eventual capacity by means of mobile equipment, and reclaimed through ground hoppers on to a conveyor system, whence the coal passes through crushers prior to delivery to the ovens bunker. Provision is also included for exporting blended uncrushed coal by rail to the Glebe plant, about a mile distant.

Hot coke is handled by a coke car of tubular construction, hauled by a diesel locomotive which incorporates a compressed air system for operating the coke car doors. The coke is cooled in a brick recirculating type quenching tower fitted with Spraco nozzles and drizzle boards, and is discharged on to a wharf 240 ft. long before being conveyed to a screening station of 200 tons per hour capacity. Here furnace coke (1 in. upwards) is separated and the remainder screened to $-\frac{1}{2}$ in., $-\frac{3}{4}$ in. and -1 in. fractions. Furnace coke is loaded into wagons for transit to the blast furnaces by means of a boom conveyor.

An indirect by-product recovery plant provides tar and liquor separation, gas cooling, exhausting and washing equipment with naphthalene wash oil regeneration plant and a steam distillation benzole plant. Service lines are also provided to interconnect the Glebe and Deene by-product plants and to supply steam, water, etc., necessary for production purposes.

The entire plant has been planned to provide for extension if required, and also to merge with future iron-making developments on the new site.

In addition to the above, a 2,000,000 cu. ft. capacity dry coke oven gasholder of Klonne design, manufactured by Ashmore Benson Pease & Company, Limited, is installed with a gas control system. There is also a desulphurizing plant for the removal of hydrogen sulphide from the total gas make, and a wet catalyst plant for the production of 23 tons per day of sulphuric acid.

Close to the new battery an amenity block has been built containing administrative offices, and a canteen and other facilities for the 120 men who will work at the Deene site.

The illustration above is of the new plant from the pusher side with the ovens bunker in the background.

New Members of DSIR Research Council

LORD HAILSHAM, Minister for Science, has appointed five new members of the Council for Scientific and Industrial Research. They are Mr. L. H. Bedford, director of engineering, guided weapons division, English Electric Aviation, Limited; Mr. G. B. R. Feilden, FRS, managing director, Hawker Siddeley Brush Turbines, Limited; Prof. E. R. H. Jones, FRS, Waynflete Professor of Chemistry, Oxford University; Prof. O. A. Saunders, FRS, Professor of Mechanical Engineering, Imperial College, London; and Mr. H. C. Tett, chairman and managing director, Esso Petroleum Company, Limited.

Three members who have completed their five-year term of office retired last Saturday. They are the former chairman, Sir Harry Jephcott, chairman of Glaxo Laboratories, Limited; Prof. C. E. H. Bawn, FRS, Professor of Inorganic and Physical Chemistry, Liverpool University; and Sir Willis Jackson, FRS, until recently director of research and education, A.E.I. (Manchester), Limited.

Obituary

MR. ESSINGTON LEWIS

DEPUTY chairman of the Broken Hill Proprietary Company, Limited, Mr. Essington Lewis died on Monday at the age of 80. The development of BHP, one of Australia's largest industrial concerns and considered to be the largest steel producer in the Commonwealth, was due in no small measure to his guidance from 1926 when he became managing director. He was appointed chairman in 1950, but two years later, when he was 71, he decided to accept the less onerous position of deputy chairman on account of advancing years.

He carried through the task of Director-general of Munitions and Aircraft Production in the last war with the same zest and thoroughness which he gave to BHP and for his work was made Companion of Honour in 1943. He became the first chairman of the Australian Council of Industrial Design in 1957 and first chairman of the Australian Administrative Staff College—31 years after he had introduced a staff training scheme for the education of young BHP employees. The company, under Mr. Lewis, gave generously to establish chairs of mineralogy at the Universities of Adelaide and Melbourne.

MR. W. JENKINS GIBSON

FINANCIAL director of Hadfields, Limited, Sheffield, and deputy managing director of the subsidiary company, Millspaugh, Limited, Sheffield, Mr. W. JENKINS GIBSON died last Friday at the age of 63. A native of Glasgow, he qualified as a member of the Institute of Chartered Accountants of Scotland, and later took his fellowship with the Institute of Cost and Works Accountants, the Chartered Institute of Secretaries and the Institute of Company Accountants.

Mr. Gibson joined Hadfields as assistant to the secretary in 1927, and his career with the company was marked by a steady progression through the offices of chief accountant, to local director in 1937, and financial director in 1946.

He became a Justice of the Peace in 1954, and was also actively connected with many local voluntary organizations, in particular the Boy Scout movement, of which he was District Commissioner for the City of Sheffield.

For many years secretary of the Bowhill (Fife) branch of the National Union of Mineworkers, Mr. JAMES GALLOWAY has died at the age of 83.

Mr. ARTHUR SUNDERLAND, who died recently, had been in the employ of Frank Wigglesworth & Company, Limited, makers of power transmission appliances, etc., of Shipley (Yorks), for 32 years and a director since 1953. He was 66.

Mr. ALFRED TURNER, chairman of A. W. V. Turner & Company, Limited, colliery and mill furnishers, etc., of Sheffield, collapsed in his office at work last week and died in the ambulance on the way to hospital. He was 70.

The death has taken place at Mansfield of Mr. LIONEL CLINTON MAITLAND, aged 80. During his working life of 63 years he held numerous appointments in the mining industry, the last one being that of technical librarian at the Edwinstowe headquarters of No. 3 Area, East Midlands Divisional Coal Board. He retired two years ago.

Mr. JAMES C. RENNY, retired foreman engineer with Anderson, Boyes & Company, Limited, mining machinery manufacturers, of Motherwell (Lanarkshire), has died. He joined the firm in 1905 and retired in 1955. He took an active part in the works welfare schemes and was a founder member and chairman of the benevolent fund.

The death has occurred of Engineer Rear-Admiral CHARLES WILLIAM LAMBERT, general works manager of the Appleby-Frodingham Steel Company, branch of the United Steel Companies, Limited, until he retired in 1953. He was 70. Following a distinguished career in the Royal Navy, Admiral Lambert joined Appleby-Frodingham in 1946 as chief engineer and two years later was appointed general works manager. He was made CB in 1946.

Coal Price Factor in Electricity Charges

AT the end of a three-day tour of South Wales, the Minister of Power, Mr. Richard Wood, speaking at a Press conference on Friday, said that the answer to warnings that electricity charges might have to be reviewed in South Wales and south-east England in 18 months' time because of high coal costs, was to try and increase productivity in the coal-mining industry. The coal price factor would be taken into consideration when the Government set economic targets for the electricity industry and the electricity boards would have to decide how best to meet the position.

Referring to the two anthracite collieries at Cynheidre and Abernant, Mr. Wood said he thought the Coal Board had been wise to develop these projects in stages. He knew the board was soberly confident about the future of the two pits. Of the Graigola pilot plant for developing a special type of smokeless fuel, the Minister said he thought the process a very good one and he hoped it would be successful so that the board could establish more plants in Wales and so make a big contribution to the smokeless fuels he wanted to see produced to comply with the Clean Air Act.

Mr. Wood, during his tour, met executives of the Coal, Electricity and Gas Boards, and visited the Graigola plant, the new methane-operated coking plant at Coed Ely Colliery, Tonyrefail, a licensed mine, the British Petroleum oil refinery at Llandarcy, and the new Spencer Steelworks at Llanwern, which is being built for Richard Thomas & Baldwins, Limited.

MEMORIAL SERVICE TO SIR ELLIS HUNTER

MEMORIAL service to the late Sir Ellis Hunter, chairman of Dorman Long & Company, Limited, and one of the leading personalities in the British steel industry, was held last Friday at Linthorpe Parish Church, Middlesbrough. The service was conducted by Canon H. A. Wareham, Vicar of Linthorpe, and Mr. E. T. Judge, deputy chairman and managing director of Dorman Long (Steel), Limited, read the lesson.

Besides members of Sir Ellis's family, the service was attended by many representatives of industry and public life in the North-East.

FLYWHEEL LOCOMOTIVES FOR MINES

Review of Current Trials and Developments

by J. K. GESSLER,* B.Sc., A.M.I.Mech.E., A.M.I.E.E., A.M.I.Loco.E.

A description of the Oerlikon electrogyro which powers an experimental surface locomotive built for the National Coal Board is given in this paper. The conclusions drawn from the trials are outlined and other types of flywheel storage systems suitable for underground use are discussed. The author concludes by outlining a proposed design for a gyro locomotive charged by compressed air. The paper was read at a meeting of the South Wales Branch of the National Association of Colliery Managers on October 25, 1960.

APPLICATION of flywheels for the storage of energy has a long history and their adoption in engines, presses, etc., to smooth out torque-peaks is well known. In these cases energy is stored and released in, at most, a few seconds. There are, however, on the Southern Region of British Railways a number of electric locomotives which utilize flywheels as part of motor-generator sets. The energy so stored permits heavy goods trains to go over complex crossings which have long gaps in the conductor rails without losing speed.

Only one flywheel system has so far been used to any extent for relatively long-term energy storage. This is the Oerlikon electrogyro, which powers an experimental surface locomotive built for the National Coal Board.

An electric vehicle which does not draw energy from overhead wires or a third rail nor carries a storage battery offers many attractions. The costs of overhead lines and railbonding for the one system, or batteries which have to be periodically replaced for the other, are substantial, and in many fields rule out electric traction. For such applications the Swiss firm, Oerlikon, Limited, developed a flywheel-motor-generator combination which works in conjunction with condensers. As the operating cycle of this system requires about four short charges per hr., it corresponds closely to the haulage cycle in many mines where a run of 15 to 20 min. inbye is followed by a few minutes' shunting before the outbye run.

For trials in this country the NCB decided to have an experimental surface locomotive built[1]. By making it a standard-gauge shunting unit of about 30 tons, it would not merely provide the required data for possible underground locomotives, it would also show how the equipment stood up to regular service conditions. At the same time, it could earn its living in a colliery yard. Before the NCB locomotive entered service, some 18 gyro buses had been built. A few underground locomotives were operating in South African gold mines, but these were not flameproof and would in any case have been too small for our conditions. The NCB locomotive naturally benefited by the experience gained with the earlier units. It was also the first with two electrogyros working in parallel.

* Chief development engineer (electrical), British Ropes, Limited.

Principle of Operation

The principle of operation is shown in Fig. 1. The electrogyro consists of a squirrel-cage motor built on the shaft of a heavy flywheel. When power is supplied to this motor, the speed of the unit increases until it is just below synchronous speed, *i.e.*, nearly 3,000 r.p.m. for a 2-pole 50 cycles motor. At this speed, one may say that the unit has been "charged." The contacts are retracted and the locomotive is ready for use. Power from the flywheel is now converted back into electrical energy and flows to a traction motor which drives the wheels.

The condensers shown in both diagrams require a fair amount of space, but they are essential for the excitation of the squirrel-cage machine when the electrogyro supplies energy to the traction motors. The amount of capacitance needed for excitation depends on the flywheel speed; the lower the speed, the more capacitance is required. Again, heavy loads require more excitation than light loads. The value of the capacitance in circuit is controlled by the driver in the same way as the resistance notches of battery locomotives[2].

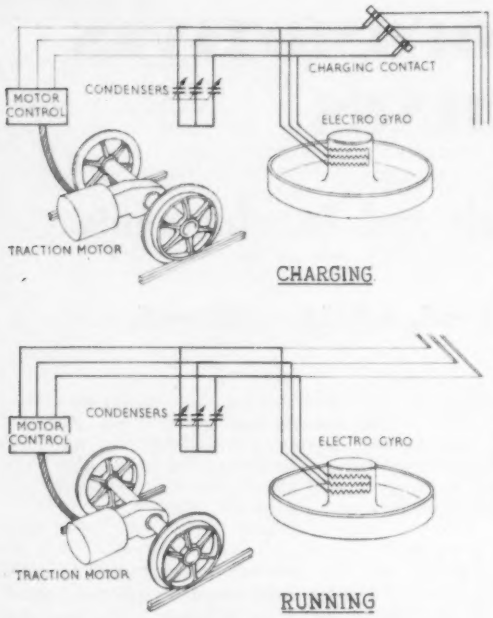


FIG. 1.—PRINCIPLE OF ELECTROGYRO SYSTEM.

With too little capacitance, the machine will not excite. Too much produces overvoltages which would be dangerous unless automatically prevented. It will be seen that the system involves some interesting control problems and it is to the credit of Oerlikon that these problems have been solved. Its control circuit permits the use of electrical machines of the simplest type, *i.e.*, the squirrel-cage motor, the machine acting initially as a motor to run up the flywheel and then as an induction generator. The condensers which are needed when generating are also used during charging to improve the power factor.

Design of NCB Electrogyro Locomotive

Figs. 2 and 3 show how theory has been translated into practice on the NCB single-cab shunting locomotive. The mechanical parts are largely of a standard type, suitable for shunting service in colliery yards. Sharp track curves led to the short wheel base of 6 ft. The only unusual features are the charging masts at either side, which swing out through 90 deg. at charging points.

The two gyros, which are suspended on rubber/steel sandwich mountings, are placed directly above the axles, which are individually driven by squirrel-cage traction motors through double-reduction gears. Condensers are accommodated in two frames in the front. Between them is the air compressor. Large air-storage cylinders are provided, since the compressor only runs at charging points. Each charging mast carries three power contacts and below them, a 24-V pilot contact. When charging, the mast is moved out and these contacts feed four bare copper bars on a mast near the line. The circuit is so arranged that the contacts of the charging station are dead unless the locomotive is actually charging.

The electrogyros are mounted with their axes vertical in order to minimize the effect of gyroscopic reaction moments on the running qualities of the vehicle. Any rotating flywheel which is moved bodily in space resists such external movement. With a vertical shaft, there is no effect when the locomotive goes round horizontal curves. A flexible mounting reduces, but does not entirely eliminate, all gyroscopic effects when the locomotive rolls or pitches on bad track. Generally speaking, the riding qualities are excellent.

The flywheel of the electrogyro weighs 1½ tons and is 5 ft. 4 in. dia. The flywheel shaft carries the electric rotor, which is relatively small. In order to run up the gyro quickly the motor must absorb an input which is far beyond its continuous rating; hence a water-cooled stator has been fitted. To reduce windage losses, the casing is filled with hydrogen, which carries heat from the windings to the water jacket. To assist heat transfer, the squirrel-cage rotor winding is made of copper tubing through which the gas passes at a velocity of 300 ft./sec. There are no shaft ends which have to be sealed. The only connections through the

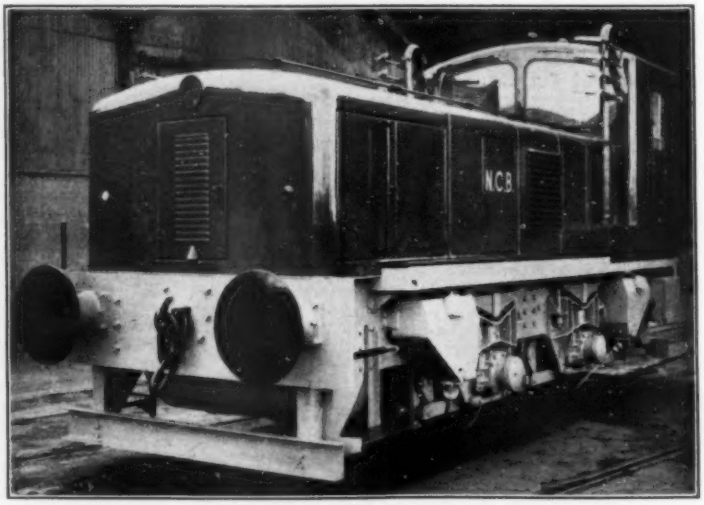


FIG. 2.—NCB ELECTROGYRO SHUNTING LOCOMOTIVE.

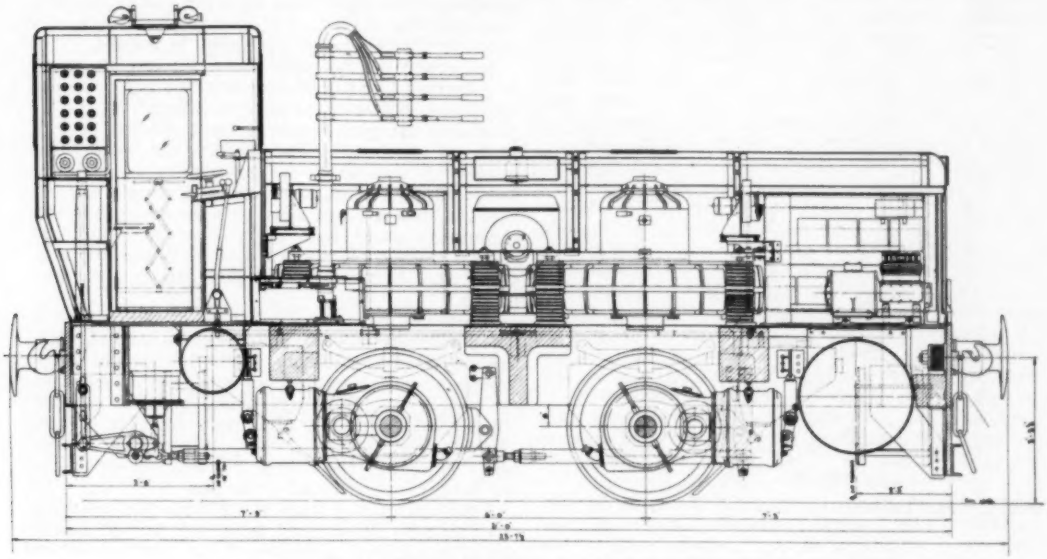


FIG. 3.—LONGITUDINAL SECTION OF NCB EXPERIMENTAL SHUNTING LOCOMOTIVE.

casing are electrical. Once the case is evacuated and filled with hydrogen at two thirds atmospheric pressure, the unit is only opened for major maintenance. Each electrogyro can store 9 kWh of energy, of which 6 kWh is available in service. The enormous difference which hydrogen makes is shown in Fig. 4. In free air, a flywheel would be stopped by windage resistance in about 4 hr., but in hydrogen the unit runs for 12 hr. if no energy is abstracted.

The traction motors of the shunting locomotive are internally air-cooled squirrel-cage motors, but have also a water-cooling shell. There is a double-reduction gear incorporating both bevel and spur gears. The stator windings are arranged for pole changing. The four combination (12, eight, six, and four poles) provide, in effect, a built-in gearbox. Fig. 5 shows the motor characteristic for the nominal design conditions, *i.e.*, 550-V., 50 cycles in heavy lines. The 12-pole connection gives high starting tractive effort, *i.e.*, high torque at low speed, and the four-pole arrangement, low torque at high speed.

As the gyro speed falls in service, so do frequency and voltage and the broken lines show the characteristic curves at 400 V. Vehicle speed and tractive effort are reduced. On the other hand, the circuit permits temporary increases in voltage for heavy starts. The effect is indicated by the chain dotted lines for 650 V.

The driver has two main controls, which govern the number of motor poles and the excitation. Pole changing of traction motors is equivalent to a gear change. The condenser control determines gyro excitation and may be likened to the accelerator of a car. Operation requires a little more skill than a battery or diesel loco, but the driver was soon quite happy with the controls. On miscellaneous shunting he must occasionally look at the gyro speedometer

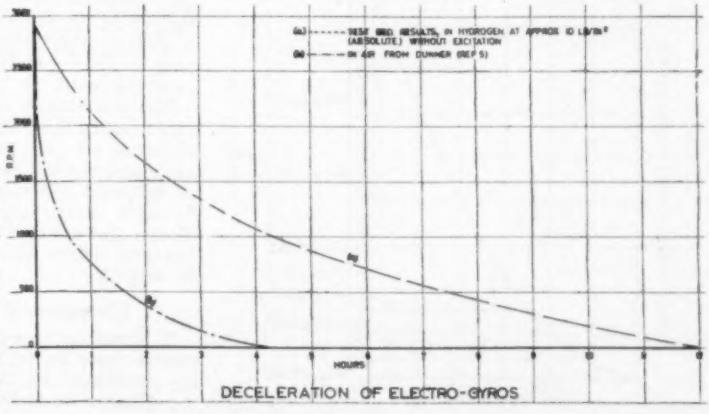


FIG. 4.—DECELERATION OF ELECTROGYROS IN HYDROGEN AND IN AIR.

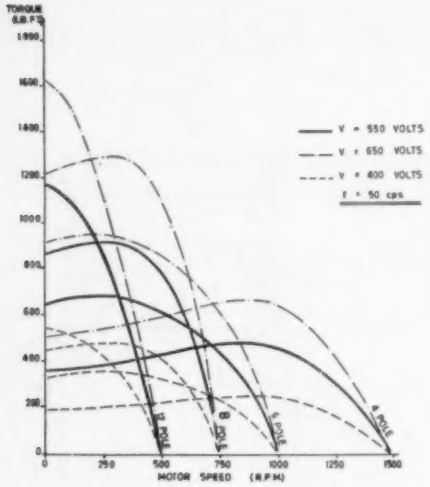


FIG. 5.—ELECTROGYRO LOCOMOTIVE—TRACTION MOTOR CHARACTERISTIC.

so as to be at a charging station when the gyro speed falls to 1,800 r.p.m. If the charging stations are correctly positioned, the need to charge for two or three minutes presents no problem.

Practical Considerations of Stored Energy

Fig. 6 shows graphically the stored energy at different flywheel speeds. Stored energy is proportional to the square of the speed. There is therefore no point in discharging the locomotive down to a very low flywheel speed. Normally the gyro works between 2,900 and 1,800 r.p.m., sometimes between 2,950 and about 1,650. This curve also indicates the effect of windage losses when

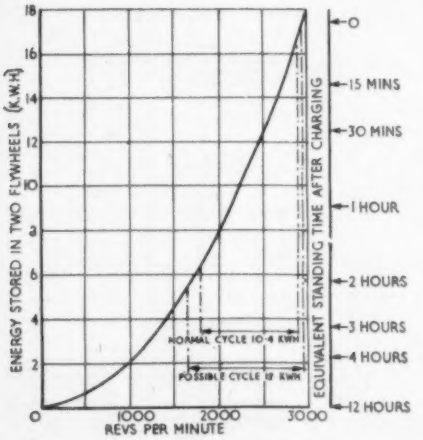


FIG. 6.—ENERGY STORAGE OF THE NCB ELECTROGYRO SHUNTING LOCOMOTIVE.

standing. The right-hand scale represents standing time after the charge. For instance, half an hour's standing reduces the stored energy by a third.

In spite of the hydrogen filling, the loss in energy is quite high and for efficient working one must not stand about after charging to top speed. It is also clear that the gyro system is most efficient at high rates of discharge. The harder the locomotive works the smaller is the proportion of windage losses. But there are reserves. If, during a normal run, the train is stopped due to some emergency, the locomotive could wait an hour or more and yet remain mobile. In such a case it would leave its train, run light to a charging point, and then return.

When the gyros are discharged quickly, as on a six-minute run between Seaton Delaval and Hartley, the conversion efficiency from flywheel to locomotive wheel is about 60 per cent. On longer runs, the proportion of windage losses increases and the efficiency drops rapidly when runs take over 15 min. The charging efficiency is a little under 70 per cent. Therefore, the overall efficiency from charging mast to wheel is about 40 per cent.

Although during trials there were few teething troubles with the control gear, one serious mechanical breakdown occurred. That was the failure of one gyro suspension bearing and the incipient failure of the other after one year's operation, say, 5,000 hr. The bearings were guaranteed for 20,000 hr. and were replaced free of charge, labour costs included. This bearing problem has so far resisted all attempts to solve it. It is thought that gyroscopic forces due to track irregularities result in very high momentary impact forces and it is hoped that a softer mounting of the gyro casing will help. A new bearing design is expected to give two to four years' bearing life, which corresponds to a reasonable period between main overhauls.

There is no doubt that the basic system is practicable but some of the electrical control gear is rather delicate and perhaps a little complex for pit use. Improvements in the circuit design are possible, but would probably increase the capital cost which is already high. For general surface use the electrogyro system would seem to have no advantages over conventional locomotives.

The situation is rather different for mining and other specialized duties, where train loads and distances are constant. Safety, absence of exhaust gases and the elimination of periodical replacement of batteries are important advantages offered by flywheel energy storage. But it is necessary to discuss the transport requirements in the mining industry before the main design parameters can be settled.

Underground Flywheel Locomotives

It is well known that the trailing loads of locomotives may be limited either by starting or braking considerations. With conventional locomotives the distance between terminals is quite a separate factor and the weight of the empty train imposes no limitation. With flywheel locomotives, however,

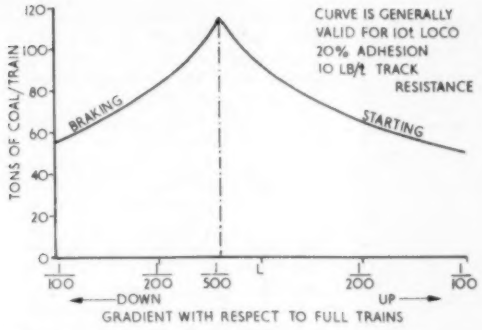


FIG. 7.—THE MAXIMUM PAYLOAD WHICH A 10-TON LOCOMOTIVE CAN HAUL ON VARIOUS GRADIENTS.

trailing load and gradient must be considered together with distance between charging stations. The given amount of stored energy determines the maximum running distance with different loads on various gradients. It follows that there are considerable variations of distances between "charges" with gradient. On routes with steeper gradients in favour of the load, the maximum distance between charging stations may be set by the energy required to take the empty trains inbye. Taking these factors together, one can obtain curves showing, for different gradients, ton-miles/hr. or/shift and tonnage moved.

The maximum payload which a 10-ton locomotive can haul on various gradients is shown in Fig. 7. The curve is based on 10 lb./ton track resistance, 20 lb./ton sticktion, 20 per cent. starting adhesion, and a mean braking effort of 16 per cent. of the adhesive weight. For these conditions, the maximum payload per train is 116 tons and that corresponds to a gradient of 1 in 500 in favour of the load. Such curves can easily be constructed for any set of conditions; they are true for all types of locomotive. Maximum payload corresponds to the gradient on which inbye and outbye tractive efforts are the same.

Subsequent calculations are based on a 10-ton flywheel mining locomotive which can store 9 kWh

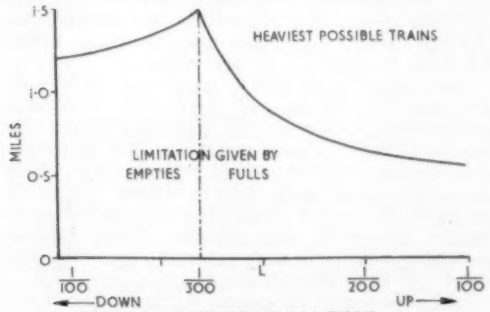


FIG. 8.—MAXIMUM DISTANCE BETWEEN CHARGING STATIONS ON DIFFERENT GRADIENTS.

of energy. Existing types have a lower energy storage capacity, but in the author's opinion nothing smaller is likely to be useful for main haulage in British mines. In addition to the data given previously, the following assumptions were made:—Energy stored, 9 kWh (at 3,000 r.p.m.); energy for acceleration, 0.9 kWh (2,950 to 2,800 r.p.m.); energy for propulsion, 4.6 kWh (2,800 to 1,800 r.p.m.); flywheel windage and friction losses based on electrogyro test data; transmission losses due to generator, traction motors, and gears are assumed 30 per cent. constant; overall efficiency during accelerating period, 50 per cent.

If the heaviest possible trains are hauled by such a locomotive, the maximum distance between charging stations on different gradients is shown in Fig. 8. It is about one and a half miles if the gradient is 1 in 300 in favour of the load, but the distance falls off rapidly if full trains have to be hauled up gradients. With shorter trains than given in Fig. 7, *e.g.*, 100 tons, the distances increase and the optimum gradient is different.

Locomotive Performance

It is important to note the effect of discharge rate on overall efficiency due to gyro windage and friction losses. It is estimated that the internal locomotive efficiency (flywheel to roadwheel) varies from 66 to 60 per cent. when the rate of discharge falls from 1 to 0.4 kWh/min. Lower discharge rates (*e.g.*, long runs with small train loads) increase the proportion of windage losses and so reduce the efficiency. Fig. 9 shows the variation of internal efficiency for an electro-

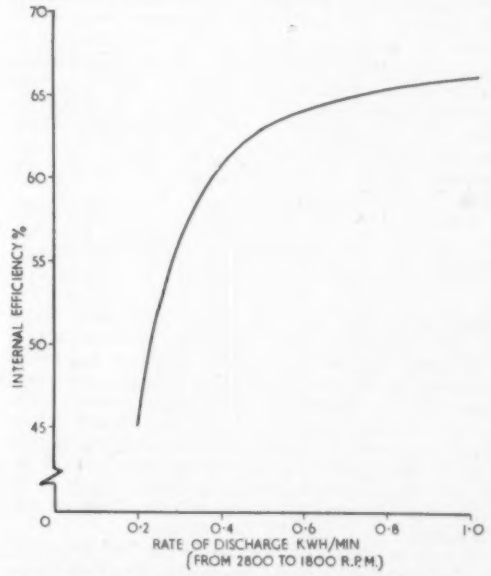
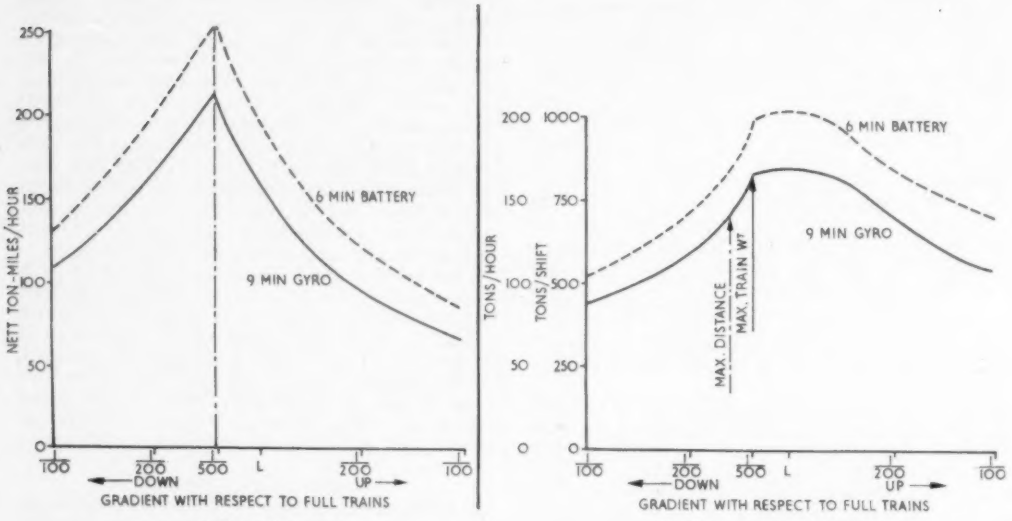


FIG. 9.—VARIATION OF INTERNAL EFFICIENCY FOR AN ELECTROGYRO LOCOMOTIVE. BASED ON AUTHOR'S CALCULATIONS.



(*a*) Ton-miles. (*b*) Tons of Coal Hauled.

FIG. 10.—COMPARISON OF HAULAGE PERFORMANCE OF 10-TON LOCOMOTIVES POWERED BY A 9-KWH GYRO AND BATTERY, RESPECTIVELY. (TIME AT TERMINALS.)

gyro locomotive, calculated on the assumptions stated. Depending on the system, other types of flywheel locomotives will be affected to a greater or lesser extent.

If the maximum performance of two 10-ton electrogyro and battery locomotives, respectively, is compared, an additional allowance must sometimes be made for standing time for charging in cases where the normal terminal time is insufficient for charging. For example, Fig. 10, giving a comparison of performance, is based on a turn-round time of 6 min. for the battery locomotive and 9 min. for the flywheel locomotive. The running distances between terminals are, of course, equal and are given in Fig. 8.

Two points are of interest:—(*a*) The curve showing the tonnage of coal transported is much less affected by the gradient than the other curves, and (*b*) the difference in ton/hr. is mainly due to the additional turn-round time. It can be shown that with the same turn-round time, there is little difference in locomotive performance.

In practice, normal turn-round times are often long enough to permit charging without extending these times. Traffic or production reasons frequently require trains to wait after shunting has been completed. Although under limiting conditions, a flywheel locomotive may transport 15 to 20 per cent. less coal than a battery unit, it is likely that in practice there will be little or no difference.

It may be concluded that while the limitations of gradients and distances are severe, flywheel locomotives might be useful for quite a number of applications. The distance between charging stations is closely linked to gradient. Units storing less than 9 kWh of energy are unlikely to be worth developing for main haulage. Two existing types of flywheel locomotives for underground work can now be considered.

Underground Electrogyro Locomotives

About eight mining gyro locomotives have been made, mainly for South African gold mines. Fig. 11 shows such a locomotive for 3-ft. gauge. It weighs 9 tons, is 12 ft. long, and is 4 ft. 5 in. wide. The electrogyro construction differs from that of the surface unit in that the motor is mounted underneath the flywheel. There is a single traction motor driving one axle directly and the other via chains. The condensers are housed in the box on the front. The limitation on width permits only a flywheel diameter of 4 ft. and a stored energy of 5.5 kWh at 3,000 r.p.m. The energy which can be taken from the flywheel is about 3 kWh and if the generator and motor efficiencies and unavoidable windage losses are taken into account, about 1.9 kWh is available at the wheels.

This means that with a total train weight of 100 tons, *i.e.*, 67 tons of coal, on a 1 in 300 gradient in favour of the load, the maximum length of run is about one mile. The limitation is the energy required to haul empties inbye. This particular Oerlikon locomotive would appear to be too small for the usual main haulage duties to justify flameproof development. There is also the element of uncertainty regarding gyro bearings which has been mentioned.

As flywheel systems seemed worth further study, two approaches were investigated. Increasing the stored energy, with basically the same electrical circuit, could be achieved by introducing a gear

between flywheel and motor so as to bring the flywheel speed to, say, 6,000 r.p.m., but retaining a two-pole 50 cycle motor with a synchronous speed of 3,000 r.p.m. The capital cost might well be higher than that of the present design.

A further approach was that of using compressed air to run up the flywheel and either straight gearing or a hydraulic drive to the road wheels, which should reduce capital cost by eliminating the electrical transmission. A great attraction is the inherent flameproofness of the power unit. Increasing the stored energy becomes possible.

Russian Compressed-air Flywheel Locomotive

A Russian prototype locomotive (Fig. 12) uses two stationary 30-h.p. air motors which charge from the normal air main in the mine, *i.e.*, 70 lb./sq. in.[3,4] Charging takes about 7 min. between runs. Fig. 13 shows the locomotive at a charging point. The unit is 4 ft. 4 in. wide and weighs 6.3 tons. There are two 32½-in. dia. flywheels, each weighing 1.1 tons, which rotate in air. The energy stored in each flywheel is 1.7 kWh at 3,000 r.p.m., *i.e.*, this locomotive stores 60 per cent. of the energy stored by the Oerlikon gyro mining locomotive. The mechanical transmission has a single ratio which gives speeds falling from 5 to 1.7 m.p.h. as the flywheel speed falls from 3,000 to 1,000 r.p.m.

The designers recognize that this prototype has several disadvantages. Air friction losses greatly reduce the power available and greatly limit the length of run. The drop in locomotive speed during a run is inconveniently large due to the single-gear ratio. There are also additional losses due to having two mechanically coupled flywheels. Two flywheels do only one and a half times the work of one. In 1959 it was stated that a Russian production model was being designed with one large flywheel, two gear ratios, and a built-in compressed-air drive. This unit should be more useful than the prototype. In the author's opinion, however, much more advanced designs are possible than the published information indicates. One approach is outlined in the following section.

FIG. 11.—OERLIKON ELECTROGYRO LOCOMOTIVE.

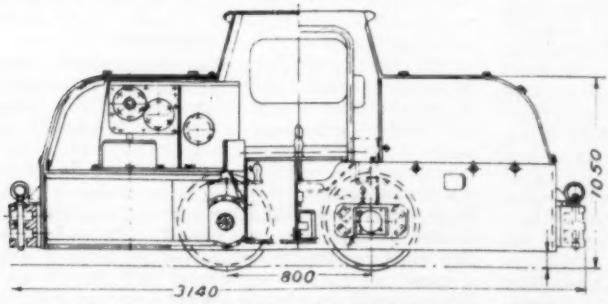


FIG. 12.—RUSSIAN PROTOTYPE FLYWHEEL LOCOMOTIVE.

Outline of Proposed Design

Existing flywheel locomotives store insufficient energy for main line haulage. Low-energy storage locomotives suitable for gate roads are of little interest for British mines due to the widespread use of conveyors for subsidiary haulage. There may be one application for a low energy storage unit in underground supplies tractors, but neither of the existing designs would be competitive with diesel units.

As vehicle dimensions restrict the flywheel diameter, its rotational speed must be increased. Elec-

trical transmission at, say, 150 cycles is not an attractive alternative. The usual gear-type air motors are very large and heavy and run at relatively low speeds. But air turbines running at high speeds are very small and permit the designer to select optimum flywheel diameter and speed, limited only by mechanical considerations.

In order to store the maximum amount of energy, the flywheel speed must obviously be the highest consistent with an adequate safety factor. It follows that for a given speed there is a severe penalty for not selecting the largest possible diameter for that speed. Thus, at 3,000 r.p.m., the Oerlikon flywheel designed for surface applications stores 6 kWh/ton, but that of the prototype compressed-air flywheel locomotive only stores 1½ kWh/ton.

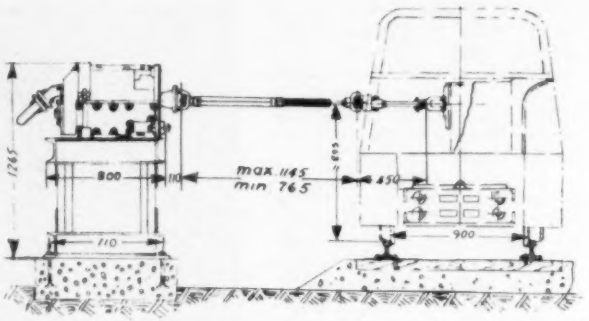


FIG. 13.—RUSSIAN FLYWHEEL LOCOMOTIVE AT A CHARGING STATION.

Since for flywheels both the maximum stress and the energy stored per unit weight are proportional to $D^2 N^2$, it follows that for flywheels of various diameters running at their respective "ideal speeds," the energy stored per ton of material is constant. (The ideal speed being determined by the same stressing and the safety factor. This approximation is strictly true only for a parallel sided flywheel, but demonstrates the trend.) Hence for the same amount of stored energy higher rotational speeds do not permit lighter flywheels.

It can be shown that for underground locomotives, the most suitable flywheel speed is about 8,000 r.p.m. for currently available materials. This speed corresponds to a diameter of under 2 ft. 6 in. and permits the storage of 9 kWh. (24,000,000 ft. lb.) for a locomotive in a flywheel weighing about 1¼ tons.

It has been shown that these losses are by no means negligible, even in a hydrogen atmosphere and that they have a considerable influence on the flexibility of locomotive operation. It is therefore proposed to run the flywheel in a low vacuum, maintained by a continuously running exhauster, which would require very little power.

The radial flow-type air turbine would appear to be most suitable, but as air turbines generally run at higher speeds than the optimum flywheel speed, gearing will be necessary. Care must be taken in the turbine design to ensure the highest r.m.s. efficiency over the flywheel working range (say, 4,000 to 8,000 r.p.m.). As the turbine will only run at charging stations, the clutch between turbine and flywheel must be interlocked with the compressed-air control so that the turbine is brought up to flywheel speed before charging begins. It is also necessary to incorporate a safety device in the inlet duct of the turbine to prevent overspeeding.

Charging operations from the normal compressed-air system of the mine, *i.e.*, about 80 lb./sq. in. is highly desirable, since this permits the charging station equipment to be limited to a valve and an air hose with a quick-make connection. The negligible cost of charging points should compensate for the higher energy costs due to the low efficiency of the compressed air. Air consumption and charging time may be selected within limits. Allowing 5 min. for a "charge" from 4,000 to 8,000 r.p.m., the energy conditions shown in Table 1 apply.

TABLE 1.—*Energy Conditions for a Charge from 4,000 to 8,000 r.p.m., Using Compressed Air.*

Unit.	Locomotive.	Underground tractor.
Energy stored at max working speed (1,000,000 ft. lb.)	24	8
Energy per charge (1,000,000 ft. lb.)	18	5
Rate of energy supply (horsepower)	108	30
Approx. air consumption at 80 lb./sq. in. (cu. ft./min.)	2,000	600

Apart from the relatively high maximum input speed of 8,000 r.p.m., the driver's gearbox would be of conventional design. Where much shunting or slow working is necessary, three speeds, as shown in Table 2, will be desirable, but two speed ratios are sufficient to compensate adequately for the fall in flywheel speed during normal running. Underground tractors require only two speeds.

TABLE 2.—*Locomotive Speeds in m.p.h. for a Three-speed Gearbox at Various Flywheel Speeds.*

Flywheel speed (r.p.m.)	8,000	6,000	4,000
Locomotive speed:			
1st gear (shunting) (m.p.h.)	2	1½	1
2nd gear (m.p.h.)	6	4½	3
3rd gear (m.p.h.)	10	7½	5

Economic Comparisons

The charging efficiency of geared turbine is about 70 per cent. and the discharge efficiency (flywheel to locomotive wheel), including allowance for power absorbed by exhauster, is between 70 and 75 per cent.

It is too early to make a reliable cost estimate for the proposed unit, but it is believed that it could be built for about the same cost as a battery locomotive complete with one battery. For an installation which requires three locomotives in service plus a spare locomotive and three batteries for each locomotive in service, the capital costs are expected to be as shown in Table 3.

TABLE 3.—*Comparison of Estimated Capital Costs Between Battery and Air Turbine/Flywheel Locomotives.*

	Battery.	Air turbine/ flywheel.
COSTS PER LOCOMOTIVE:		
Locomotive	60	80 (estimate)
Three batteries in cases	45	—
Charging equipment	15	1
Total per locomotive	120	81
COST FOR AN INSTALLATION OF THREE LOCOMOTIVES PLUS ONE SPARE:		
Four locomotives	240	320
Batteries	150	—
Charging equipment	45	1
Total for installation	435	321
Replacement batteries every five years	100	—

On the basis of equal work done (90 h.p.-hr. per shift) at the locomotive wheel and taking 1½d./kWh and 3d. per 1,000 cu. ft./min. as respective energy costs it is found that the energy cost per shift for the battery locomotive is 20s. and that for the air turbine/flywheel locomotive 34s.

In making economic comparisons one must guard against the temptation to consider percentage efficiency of energy conversion as the main criterion. Total operating costs per shift, as shown in Table 4, are the main considerations.

TABLE 4.—*Total Estimated Operating Costs in Shillings/Shift.*

	Battery locomotive.		Air turbine flywheel locomotive.	
Depreciation period (years)	8 s./shift	20 s./shi ft	8 s./shift	20 s./shift
Capital charges including replacement of batteries	93	66	56	32
Energy cost	20	20	34	34
Maintenance	6	6	6	6
Driver	45	45	45	45
Total (eight-year period)	164	—	141	—
Total (20-year period)	—	137	—	117

Conclusion

Although diesel and battery locomotives have contributed greatly to modern mining, the disadvantages of both types are well known. Existing flywheel locomotives have certainly indicated that this method of energy storage is feasible and, while tribute must be paid to the originators of the system, it must also be admitted that present designs suffer from severe limitations. However, the design described in this paper can store sufficient energy to justify its development. Such a locomotive would be in many circumstances as suitable as orthodox mining locomotives, particularly in modern mines with gradients of the order of 1 in 300. Losses due to flywheel windage can be largely eliminated, making this a much more flexible power unit than existing designs. It has also been shown that, in spite of the lower conversion efficiency, total operating costs are likely to show a considerable saving.

The advantages and limitation of the proposed design may be listed as follow:—

Advantages:—(*a*) Inherently flameproof; (*b*) no exhaust fumes and no periodical cost of replacing batteries or continuous cost and inconvenience due to cleaning flame traps; (*c*) capital costs are likely to be low; (*d*) the compressed-air system of the mine can be used. Hence charging points can be situated wherever suitable air mains exist. The cost of charging stations is negligible. The amount of compressed air required for energizing a locomotive flywheel is of the same order as that consumed by a coal cutter.

Limitation:—There is an inherent limitation to the energy which can be stored and hence to gradients and distances between charging station.

There are "horses for courses" and the mining industry has many applications for a locomotive which can store 9 kWh of energy. As the design now proposed overcomes so many disadvantages of the existing flywheel systems, detailed design studies appear to be justified.

Thanks are due to the Institution of Locomotive Engineers for the loan of blocks, to Oerlikon, Limited, for permission to publish certain illustrations, and to engineers of Hawker-Siddeley-Brush Gas Turbines, Limited.

The paper is based on work done by the author as traction engineer with the National Coal Board and he is grateful to the director of the Central Engineering Establishment and to the chief traction engineer of the NCB for permission to publish this paper. Any opinions expressed are those of the author and not necessarily those of the board.

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SHAFT TOP SAFETY BLOCK

A SAFETY stop for tubs standing at the pit top has been devised by Mr. J. Slater, of the National Coal Board's East Midlands Division. The safety block is positioned between the rails on which the tubs run and is mechanically connected to the kep operative mechanism.

When the cage is not at the landing level the keps are always standing in the withdrawn position. In these circumstances the safety block is raised, thus preventing the passage of tubs.

When a cage arrives at the loading level the action of putting the keps under, lowers the safety block, and so frees the waiting tubs for loading. These tubs are controlled by normal axle catches, the safety block being an additional feature.

IMMEDIATE CONSTRUCTION of a steelworks of 250,000 to 300,000 tons annual capacity has been decided upon by the Organization for the Industrial Development of Greece. Completion is scheduled for 1965.

BRITISH IRON AND STEEL INDUSTRY TRANSLATION SERVICE

FOLLOWING is a list of some new translations available from the Iron and Steel Institute under its translation service scheme. Translations are all classified by numbers, and these should be quoted on applications, which should be addressed to the institute at 4, Grosvenor Gardens, London, S.W.1.

1796: "Differential Determination of Oxygen in Metals by Bromination-reduction. R. DURAND and F. NOUYRIGAT. Rev. Mét., 1960, 57, Apr., 347-353. £3 10s.

2142: "Apparatus for the Isolation of Residues in Alloyed and Unalloyed Steels According to P. Klinger and W. Koch." STRÖHLEIN & COMPANY, Düsseldorf (pamphlet, five pages). £2.

2148: "Calculation of the Coefficient of Friction in the Working of Metals by Pressure, Based on the Theory of the Slip Band." P. A. IVANOV. Kuznechno-Shtampov., 1960, 2 (10), 4-6. £2 15s.

2149: "Semi-automatic Device for Indicating the Dimensions of Large Blocks During Forging on Hydraulic Presses." O. D. BYCHKOV. Kuznechno-Shtampov., 1960, 2 (10), 30-35. £4 5s.

2155: "Directional Dependence of Magnetic Properties in Electrical Sheet and its Measurement." J. RUESS. Elektro-technische Zeitschrift—A, 1959, 80, Sept. 1, 588-593. £4.

2204: "Electric Resistance Welding of Tubes at Higher Frequencies." J. K. BOHNEN. Blech., 1960, 7 (10), 650-653. £2 10s.

2223: "Basic Refractory Waste—a Valuable Raw Material." M. N. KAIBICHEVA, M. N., *et al.* Metallurg., 1961, Jan., 18-20. £2 10s.

2227: "A Brief Survey of the Use of Water-glass in the Manufacture of Welding Electrodes." J. VIDRMA. Zváranie, 1960, 9, Aug., 242-245. £4 5s.

2271: "Operating Experience with Flame Spectrometers in the Determination of Calcium and Magnesium in Steelworks' Laboratories." K. ABRESCH and W. DOBNER. Arch. Eisenhüt., 1958, 29, Jan., 25-34. £9 15s.

2273: "Methods of Removing Surface Defects from Raw Materials Before Rolling." M. TYLUSINSKI. Hutnik (Poland), 1960, 27 (5), 182-188. £4 15s.

2329: "The Two-colour Pyrometer." P. RODICQ and G. MAILLOT. Rev. Mét., 1955, 52, June, 477-484. £5 5s.

2026-2028. 2035: Four papers presented at the centenary celebrations of the Verein Deutscher Eisenhüttenleute, Düsseldorf, November 3-4, 1960 (JISI abstr. 1961, July, 337*a*). Stahl Eisen, 1960, 80, Dec. 8:—2026: "The Development of Metallurgical Processes and Production Methods 1860-1960" (with bibliography: 113 refs), F. A. SPRINGORUM, pp. 1838-1851; 2027: "Examples from the Historical Development of Steel Shaping," W. OCHEL, pp. 1852-1863; 2028: "The Function of Steel in Technical Developments in the Last Hundred Years," H. KALLEN, pp. 1864-1877; 2035: "The Development of Technology and its Influence on the Cost Pattern of Iron and Steel Production." P. RHEINLANDER, pp. 1878-1890. £6 each, or £20 for the set of four.

1974: "The Department of Economic Control in the Service of Top Management: I—Functions and Position of Production Control Within the Works." W. SCHÜTTE. Stahl Eisen, 1960, 80, Oct. 27, 1551-1553. £2 10s.

1975: "The Use of Oxygen in a 100-ton Maerz-Boelens Furnace at Hörde." H. J. KRABIELL and E. KNACKSTEDT. Stahl Eisen, 1960, 80, Oct. 27, 1492-1496. £4.

2116: "Welding Grey and Nodular Cast Irons." M. PUSCHNER and G. SUCHANEK. Technica, 1960, 9, Oct. 7, 1295-1298. £4.

2122: "Influence of the Initial State of a Metal on Changes in Crystalline Structure during Fatigue at High Temperatures." J. DE FOUQUET. Rev. Mét. Mém. Sci., 1960, 57, Mar., 232-240. £5 10s.

2139: "Theoretical Discussion of the Influence of Ferro-magnetic Coercive Forces of Spheroidal Inclusions which are Small as Compared with the Thickness of the Bloch Walls." E. SCHWABE. Annalen der Physik, 1952, 11 (2-3), 99-112. £3 10s.

2156: "Measurements in Electric Sheet in the Laboratory and in Production." W. KRUG. ETZ-A., 1959, 80, Sept. 1, 593-599. £4 5s.

2159: "Surface Conditioning of Ingots and Billets." G. KIHLGREN. Jernkont. Ann., 1956, 140 (4), 314-344. £6 15s.

2180: "The Morphology of Oxidation Films." J. PAIDASSI. Third Colloquium on Metallurgy, Corrosion, 1959 71-110. £8 5s.

2246: "The Pressure Drop in the Inlet Zone of Pneumatic Transport Systems." R. JUNG. Forschung auf dem Gebiete des Ingenieurwesens, 1958, 24 (2), 50-58. £5 10s.

2266: "The Problem of Skin Rupture in the Continuous Casting of Steel." J. GOUZOU and J. ZAEYTYDT. Rev. Univ. Mines, 1961 (3), 110-134. £10.

2297: "The Use of Analogue or Digital Computers in Solving Heavy-current Problems: II—Transients in a Three-phase Induction Motor." J. F. BLOM. De Ingenieur, 1960, June 17 (25), E.42-E50. £3 15s.

2307: "Effects of Preliminary Annealing in the Recovery Range on the Result of Recrystallization Annealing of Deep-drawing Sheets." G. ODONE and V. BERRUTI. Stahl Eisen, 1960, 80, July 21, 1018-1023. £3 5s.

2309: "Wear of Chrome-magnesite Bricks in Open-hearth Furnace Roofs." S. KIENOW. Arch. Eisenhüt., 1961, 32, Feb., 77-87. £6 10s.

2326: "Assessing Performance and Consumption Data in Iron and Steel Works." H.-H. PLUGGE. Stahl Eisen, 1961, 81, Mar. 30, 408-421. £8 10s.

2327: "The Kaldo Process at Sollac." R. COLMANT, *et al.* Rev. Mét., 1961, 58, Jan., 39-43. £2 10s.

2348: "The Influence of the Flux on the Properties of Welded Joints in High-strength Steel." K. V. LYUBAVASKY, *et al.* Svar. Proizv., 1959 (2), 23-25. £2 5s.

2353: "On a New Dust-measuring Method." A. WINKEL. Staub, 1959, 19, July 1, 253-255. £2 5s.

2355: "Conversion and Processing Cost Analysis in Iron and Steel Works as a Guide to Rationalization." K. E. POPPE. Stahl Eisen, 1955, 75, May 19, 633-640. £5 10s.

2391: "The Heating of Large Ingots in Regenerative Soaking Pits." N. YU. TAITS, *et al.* Izvest. VUZ Chern. Met., 1960 (8), 160-166. £4 10s.

2392: "The Effect of Aluminium Nitride on the Forgeability of Steel." P. BASTIEN and P. PORTEVIN. Comptes Rendus des Séances de l'Académie des Sciences, 1960, Nov. 21, 2347-2349. £2 5s.

CONSTRUCTION OF OPEN-HEARTH SHOPS

with Linear and Island-block Location of the Furnaces

As a corollary to its policy of building larger open-hearth furnaces the steel industry in the Soviet Union has given serious consideration to a somewhat unconventional layout for an open-hearth melting shop. The pros and cons of this new layout, known as " island block " layout, are presented in the following two papers translated from Metallurg.

FIRST of the papers, by I. D. Vikhrev and I. A. Afonin (Metallurg, 1960, V, No. 1, pp. 18-22), is very much in favour of the unconventional " island-block " layout, but the second paper, by N. S. Miroshnichenko (Metallurg, 1960, V, No. 7, pp. 21-23), severely criticizes the arguments of the first paper and strongly expresses the view that the case for " island-block " location has not been established.

Considered together, the papers present both cases very thoroughly. It appears that, by way of experiment, a new iron and steel works is to be built with an O-H shop with " island-block " location of the furnaces.

PAPER BY I. D. VIKHREV AND I. A. AFONIN

Recently there has been a wide expansion in the number of very large open-hearth furnaces with capacities of 500 tons and over. The planned figures for the development of the economy from 1959 to 1965, confirmed by the XXI Session of the Communist Party of the Soviet Union, provide for an average annual increase in the melting of steel of about 5,000,000 tons over the five-year period. This increase must be attained both by a rise in the productivity of open-hearth furnaces already in operation, and also as a result of the construction of new big-capacity furnaces.

The installation of furnaces of greater capacity has entailed a search for new alternative designs in the planning of open-hearth shops. A new blueprint has now been worked out for the planning of a shop with island-block location of the furnaces for one of the iron and steel works currently under construction (Figs. 1 and 2).

A technical and economic comparison between open-hearth shops with linear and island-block location of eight furnaces of 500 tons capacity, put in hand by Gipromez, has shown that with island-

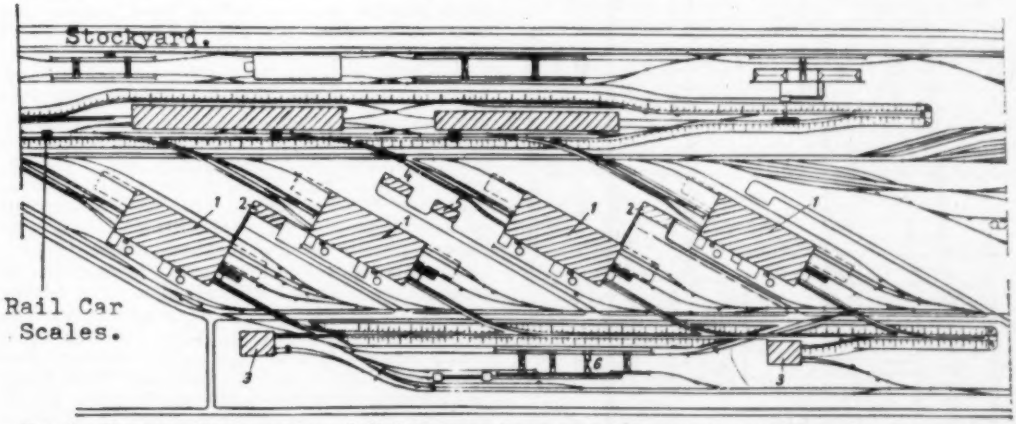


FIG. 1.—PLANNING DIAGRAM OF AN O-H SHOP WITH ISLAND-BLOCK LOCATION OF THE FURNACES, SHOWING:—(1) MAIN BUILDING BLOCK; (2) EXISTING BUILDINGS; (3) MIXER SECTION; (4) REPAIR WORKSHOP; (5) EXPRESS ANALYSIS LABORATORY; (6) SLAG DUMP.

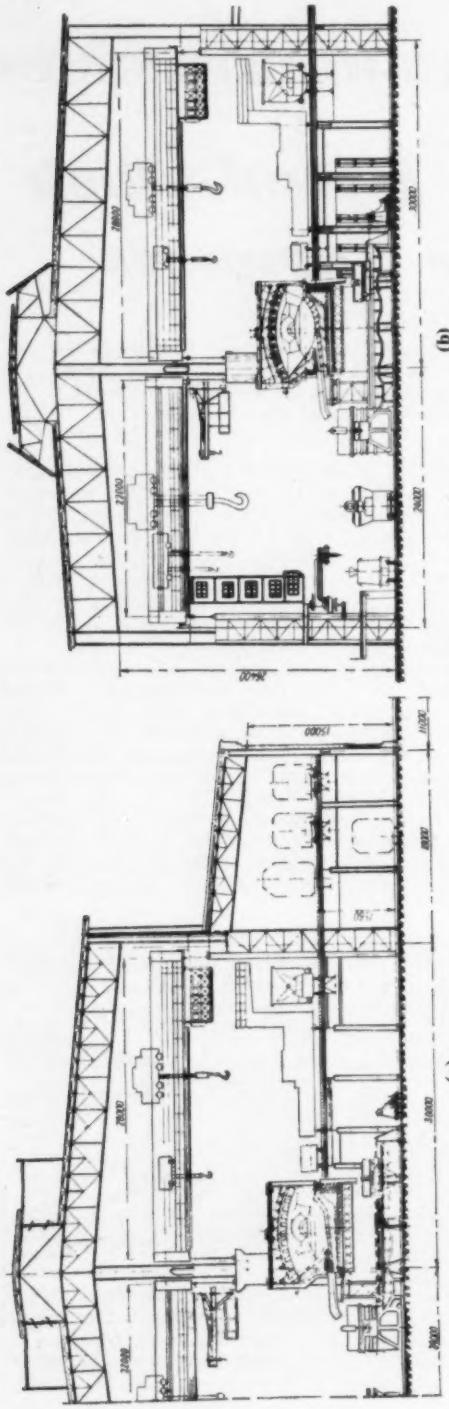


FIG. 2.—TRANSVERSE SECTIONS OF THE MAIN BUILDINGS OF AN O-H SHOP: (a) WITH LINEAR LOCATION OF THE FURNACES AND (b) WITH ISLAND-BLOCK LOCATION OF THE FURNACES.

block location of the furnaces and a single teeming floor, the output of a shop can be greater by 3.2 per cent. than with linear location. This is achieved thanks to a reduction of 18 min. in the duration of a melt. In addition, if there is island-block location of the furnaces, and two teeming floors are constructed for one block of furnaces, the output of a shop can be further increased by about 10 per cent. through the avoidance of hold-ups after tapping the steel, where two melts are finished at the same time. Thus it may be suggested that output is increased by 13.2 per cent.

With linear location of the furnaces the main building has three bays. The new design of a shop with island-block location of the furnaces consists of four separate two-bay blocks. In place of the stockyard bay, there is only one wing 6.0 m. wide, in which the control pulpits are located. Trains with stockyard materials pass directly into the charging-side bay, and stockyard trains are parked at the end of the main building on an elevated railroad, where there are supplementary railway tracks. When a second teeming floor is built in the block the plan provides for the possibility of lengthening the pouring side bay at one end of 48 m., and at the other by 36 m.

Comparison of the data presented in Table 1 shows that in the main building of a shop with island-block location for one furnace more crane equipment is installed, the cost of which is about Rs. 8,000,000 for the whole shop. A certain additional capacity of the equipment lightens the physical effort of the workers and is a reserve for any subsequent increase in the furnace charge.

TABLE 1.—*Quantity of Lifting and Transport Equipment Required for Open-hearth Shops.*

Plant.	Loading capacity, tons.	Number of plant units for furnace locations:	
		Linear.	Island-block.
Bridge hot-metal crane	180/50	5	8
Low charging machine	10	6	8
Bridge ladle crane	350/75/15	8	8
Bracket-type mobile crane ..	10	4	4
Bracket-type, rotating mobile crane	3	8	8
Monorail car for crane repairs ..	10	5	8

The construction of an open-hearth shop is normally connected technologically with the installation of other plant (blast furnaces, sinter plants, coke-oven batteries, etc.). Therefore, a standard plan for organizing the operations of a shop with linear location of the furnaces envisages long intervals between the periods when the open-hearth furnaces are brought into production. After putting the first furnaces into operation in accordance with this plan a number of drawbacks normally arise, which complicate and increase the cost of constructional and installation operations. Where shops are constructed with island-block location of the furnaces, the recommended methods of construction of the main building in accordance with standard design can be fully employed. Then, again, the more convenient planning of the shop ensures

normal working conditions on the furnaces in operation and under construction, and also by the reduction in the width of the stockyard bay from 18 to 6 m. many drawbacks are avoided.

Island-block planning of a shop provides for the delivery of loads of constructional materials from both sides of the building regardless of the number of furnaces put into operation and under construction. The need to place the foundations of further structural additions to fit in with the existing foundations and supply mains disappears, and therefore there is a decrease in the amount of uncompleted productive capacity, and the capital costs in relation to output as a whole are reduced. There is no need to construct temporary end walls of the building after the introduction of new furnaces. In addition, island-block planning of a shop eliminates the need for carrying out earth works manually and strengthening of the foundation trenches.

The reduction in the width of the main structure improves conditions of assembly of the structures, and it is possible to use only one tower crane for all the work.

From the figures shown in Table 2 it is evident that the cost of constructing a shop with island-block location is somewhat higher, due to the increase in the volume of work for the construction of overhead railroads, railtracks, and roadways, and also the water and electric power distribution networks. But an increase in the output of the open-hearth furnaces of only 3 per cent., balances out the capital costs for 1 ton of steel for shops with the different location of the furnaces. If open-hearth shops with island-block location of the furnaces having two teeming floors are constructed, the capital outlay per ton of steel is reduced by more than 7 per cent.

TABLE 2.—*Technical and Economic Data for the Construction of Open-hearth Shops of the Two Types.*

Data.	Shop with linear location of the furnaces.	Shop with island-block location of the furnaces.	
		With one teeming floor.	With two teeming floors.
Volume of main building, thousands of m.³	1,272.5	1,062.0	1,288.0
Operational floor area of main building, thousands of m.²	45.7	34.5	42.6
Annual output of one furnace, thousands of tons	450	465	510
Annual output of the shop in sound ingots, thousands of tons	3,600	3,720	4,080
Overall cost of construction of the shop, thousands of roubles	370,022	380,974	388,974
Costs of structural and assembly operations	230,287	232,630	240,630
Labour for erection of the shop, man-hours	988,000	995,000	1,030,000
Capital costs per ton steel, roubles	103.0	102.0	95.0
Expenditure of labour by structural workers per ton steel, man-hours	0.274	0.267	0.251
Area of shop, hectares	50	54	54
Building factor, per cent.	33.8	35.2	37.1

The absolute expenditures of labour for the construction of shops with linear and island-block location of the furnaces have practically the same value. The specific expenditure of labour by the structural workers per 1 ton steel with island-block location of the furnaces and one teeming floor is 3 per cent. lower and with two teeming floors 8 per cent. lower than with linear location.

From Table 3 it is evident that the absolute volumes of the earth works, and also of the operations for the erection of the sectional ferro-concrete structures and building of the railroads and roadways for shops with island-block location of the furnaces is somewhat higher than for shops with linear location, but for steel and ferro-concrete structures built on the site somewhat lower.

The disadvantage of island-block location of the furnaces in an open-hearth shop is the increase in the number of auxiliary personnel in consequence of the increased quantity of equipment for one furnace, which leads to an absolute increase in operational expenses. In addition, so far a practical test has not been made of the possibility of parking wagons with stockyard materials on the uncovered tracks of overhead railroads; it may be that it will be necessary, in addition, to construct shelters over the tracks, which lowers the economic efficiency of the island-block method of construction of open-hearth furnaces.

The basic advantages of planning a shop with island-block location of the furnaces consist in the increase in output of the open-hearth furnaces. In a shop with linear location of the furnaces an increase in output is limited by the throughput capacity of the charging and teeming side bays.

On expanding converter output, island-block planning of a shop makes it possible to construct open-hearth and converter blocks in any sequence and of any output capacity. Island-block location

TABLE 3.—*Volume of Operations for the Construction of Open-hearth Shops.*

Nature of operations.	Total volume of operations.			Specific volume of works per ton steel, when linear location equals 100		
	Linear location.	Island-block location.		Linear location.	Island-block location.	
		With one teeming floor.	With two teeming floors.		With one teeming floor.	With two teeming floors.
Earth works, thousands of m³.	908.0	999.5	1,029.5	100.0	106.2	99.5
Concrete and ferro-concrete structures built on site, thousands of m³.	79.0	75.0	78.7	100.0	92.0	88.0
Ferro-concrete sectional structures, thousands of m³.	21.2	23.5	24.0	100.0	107.6	99.9
Steel structures, thousands of tons	42.1	38.0	40.4	100.0	87.2	84.6
Length of railtracks, km.	29.5	34.7	34.7	100.0	113.6	103.5
Area of roadways, m².	5,000	9,100	9,100	100.0	125.0	113.6
Overhead railroad area, m².	12,288	15,820	15,820	100.0	125.0	113.6

of the furnaces does not in practice restrict the addition of new production units, since with simultaneous construction of several blocks it is possible to bring into operation any desired number of furnaces. Such planning creates the real, preliminary conditions for the construction of the shop by continuous rapid methods.

The island-block location of the furnaces creates favourable conditions for carrying out rapid repairs, especially during the replacement of 500-ton furnaces by furnaces of greater capacity, which will in the future have great importance. Under these conditions it is possible to carry out preliminary assembly and erection of the components of the shell of the furnace at the end or the side of the building, later moving or lifting them with a crane into the planned position.

The diagram of the general plan and the structural designs for building the main framework of steel melting shops with island-block location of the furnaces is a good basis for wide utilization of industrial methods of construction. The diagram indicated completely conforms to the principle of designing the general plan of a metallurgical undertaking from the centre to the periphery without leaving blank unutilized areas for subsequent development of the shops.

The construction of open-hearth shops as separate blocks shows a great advance in relation to the technological and structural conditions.

PAPER BY N. S. MIROSHNICHENKO

With the aims of improving the planning of open-hearth shops with large capacity furnaces, and of sharply increasing the output of the furnaces, Gipromez has developed the design of a new open-hearth shop with island-block location of the furnaces, with two 500-ton furnaces in each island-block, each of which has an annual output of 495,000 tons, making a total annual capacity of 3,960,000 tons per annum for eight furnaces.

A detailed description of a shop with island-block location of the furnaces, and a comparison of its design with a normal shop, were presented in Metallurg, 1960, No. 1, pp. 18-22.

The shop with island-block location of the furnaces consists of four independent two-bay blocks (Fig. 1). The width of the charging side bay is 30 m., and of the pouring side bay 24 m. The stock-yard bay has a width of 6 m., in which only the control pulpits are located.

Wagons with the charge materials pass directly into the charging side bay, and are parked on three ferro-concrete elevated railroads, each of 400 to 450 m. in length. In each block there is reserve space for lengthening the pouring side bay by 36 m. in one direction and by 48 m. in the other; in case of need this makes it possible to install a second teeming floor in the block. The overall length of the pouring side bays of all four blocks is 598 m. and could be lengthened to 934 m.

According to the calculations of Gipromez, island-block location of open-hearth furnaces affords the following advantages by comparison with the normal location in one line:—(1) The shop has independent loading flow lines, which do not intersect at any point, for the cold charge materials, hot metal, ingots, slag, floor sweepings and rubbish, and ingot moulds. (2) There is an increase in output of the furnaces of 10 per cent., and it is also possible to increase the throughput of the furnaces because of the elimination of idle periods on the charging and pouring sides of the shop. (3) The construction of a stockyard bay is cut out. (4) It is possible to find space for vacuum-casting plants for steel and plants for heating ingot hot-tops (electric heating, gas heating, and holding of the ingots in their moulds). The loading of the teeming floors during such heating and vacuum treatment amounts to 115 per cent. for linear location, and 65 per cent. for island-block location, of the furnaces. (5) The possibility of constructing new open-hearth furnaces while preserving the normal working conditions for the furnaces already in operation.

Comparative analysis shows that the calculations of Gipromez cannot be considered to be correct. Comparison of the most important figures for shops of both types and of their plant is presented in Tables 4 and 5. From a comparison of the data of Tables 4 and 5 it follows that there are a series of factors to the detriment of a shop with island-block location of the furnaces.

The length of the pouring side bays of the island-block shop with two teeming floors in each block is increased to 322 m., which considerably increases the quantity of plant. On the pouring side of the blocks there is not the necessary reserve of casting, wall-bracket, and cantilever cranes. All this involves considerably worse operating conditions than in a shop with linear location of the furnaces, and when melts coincide in both furnaces of one block, idle periods are inevitable at tapping time.

The installation of additional, reserve cranes, however, is linked with greater capital costs, and unbalanced utilization of expensive equipment. With island-block location of the furnaces there is a considerable reduction in the utilization of the planned equipment; the utilization of two hot metal cranes in each block amounts to a total of 40 per cent., of two casting ladle cranes 50 per cent., and of two teeming floors 65 per cent.

Block location of the furnaces in four different buildings without doubt requires an increase in the staff of shift and maintenance personnel in all branches, amounting to about 50 workers. Control of the blocks is complicated. For storage of the wagons containing charge materials it is necessary to construct three ferro-concrete elevated railroads with an overall track length of 3,700 m. To protect the charge materials from rain and snow during storage on the elevated railroads it is necessary to roof them in.

There is an increase in the length of the gas mains for the blast furnace, coke-oven, and natural gases, of air mains, of oxygen mains, of electric supply mains, of water supply mains, and of drains.

In consequence of the isolation of the blocks, the need may arise for installing in each block internal stores of refractories and powders and machinery for mixing plastic materials. Two fur-

ther points must be added for ladle maintenance: for storage, lining, and repair of steel casting ladles and tundishes, the preparation of stoppers and steel casting spouts; two furnaces for drying stoppers, two stands for tundishes, etc. It is not impossible that it will be necessary to arrange for an express analysis laboratory in each block. Connection of the blocks with existing buildings by covered passages is complicated.

The most important factor in increasing the output of the shop in the plan—an increase in the output of a furnace from 450,000 to 495,000 ton/annum—has no foundation and cannot be considered convincing.

According to the calculations of Gipromez, the duration of a melt in a furnace of a linear shop is reckoned to be 9 hr. 5 min. An increase in the output of a furnace with block location of 10 per cent. is possible by reducing the duration of a melt to 8 hr. 15 min., *i.e.*, by 50 min. as a result of elimination of the idle periods which could occur in the pouring side bay of a comparable linear shop. Such a shortening of the melt time is possible only by reducing the duration of the refining period of a melt from 2 hr. 10 min. to 1 hr. 20 min.

In practice, reduction of the duration of the refining period is not particularly easy, since tapping of the slag and shaping up of a new slag are technologically essential factors which are not included in the calculations of Gipromez.

A reduction in the duration of idle periods could be a reserve of hot time for working the furnace, thus increasing its output with block location. According to the design of Gipromez, idle periods in a shop with island-block location were taken to be 5.7 per cent. of calendar time. But efficient works with linear location of the open-hearth furnaces in their shops have already achieved better figures in relation to idle periods of the furnaces. Thus a 220-ton furnace at the Magnitogorsk Iron and Steel Works had an average of 5.72 per cent. idle time during three months; the idle periods of one open-hearth shop at the Kuznetsk Iron and Steel Works, working in extremely cramped conditions in the pouring-side bay, amounted to 5.36 per cent. of calendar time during 1958, and during this time there were no idle periods in the casting of the steel; idle periods due to a delay in the delivery of hot metal amounted to 0.39 per cent., and due to delay in the delivery of cold charge materials to about 0.04 per cent.

The presence of empty bays between the 500-ton furnaces and at their ends in a typical shop with linear location of the furnaces necessitates a length of the shop of 612 m. In consequence, the length of the railway lines in the stockyard bay is sufficient to avoid the possibility of the occurrence of idle periods on the charging and pouring sides of the shop.

Of three tracks in the stockyard bay, the centre track is for manœuvring the trucks, while the two outside ones are used for parking wagons loaded with charge materials. This makes it possible to have in the bay the necessary number of wagons with charge materials in reserve (10 to 15 wagons), and cuts out delay in the supply of charge materials to the furnaces. The area of the pouring side bay entirely ensures uninterrupted casting and allocation of the plant for heating the ingot hot tops and for vacuum treatment of the steel.

Taking into account that the construction of a shop with block location of the furnaces proves more expensive and that the working costs are higher, the conclusions of Gipromez concerning the advantages of the block plan for an open-hearth shop are theoretically and practically unfounded and false; they provide no basis for recommending the construction of new open-hearth shops with island-block location of the furnaces.

But by way of experiment it has been decided to construct in one of the new iron and steel works an open-hearth shop with island-block location of the furnaces in two blocks. Operation of this shop will make it possible to decide finally the question of the expediency of the construction of such shops.

TABLE 4.—*Comparison of the Most Important Figures for the Different O-H Furnace Shop Layouts.*

	Layout.		Assessment.
	Linear.	Island-block.	
Annual output, thousands of tons	3,600	3,960	+
Annual output of an O-H furnace, thousands of tons	450	495	+
Number of melts from shop per 24 hr.	21	23	+
Production workers	880	917	—
Total operatives	972	1,009	—
Output of ingots per annum per production worker, tons	4,091	4,316	+
Output of ingots per annum per m.² of working area, tons	48	64	+
Conversion costs, roubles and copecks	47–81	46–04	+
Specific capital costs per ton, roubles	1,030	956	+
Area of shop, hectares	50	54	—
Length of railroad tracks, km.	29.5	34.7	—
Number of points	181	206	—
Length of ferro-concrete railroad viaducts, m.	2,000	3,700	—
Area of roadways, m.²	5,000	9,100	—
Total estimated cost, millions of roubles	370	378	—

+ and − signify favourable and unfavourable to island-block layout.

TABLE 5.—*Quantity of Plant for Shops of Both Layouts.*

Type of plant.	Layout.		Assessment.
	Linear.	Island-block.	
Bridge charging side cranes, 180/50 tons	5	8	—
Low-level chargers, 10-ton	6	8	—
Bridge pouring-side cranes, 350/75/15 tons	8	8	None in reserve
Mobile cantilever cranes, 10-ton	4	4	None in reserve
Monorail cars for crane repairs, 10-ton	5	8	—
Suspended spouts for hot metal charging	8	12	—
Fettling machines	3	4	—
Sample forging hammers	2	4	—
Hoppers for transport of refractory repair materials	6	8	—
Total number of electrical-power driven machines	778	876	—
Total installed capacity, kVA	21,790	23,036	—

THE FOURTH International Conference on Non-destructive Testing, to be held in London from September 9 to 13, 1963, will be arranged by the council of the Institution of Mechanical Engineers.

Forthcoming Events

OCTOBER 7

Mining Institute of Scotland:—Visit to the Flemington electrical works, near Glasgow, of Anderson, Boyes & Company, Limited.

OCTOBER 9

Lincolnshire Iron and Steel Institute:—Meeting at the North Lindsey Technical College, Kingsway, Scunthorpe, at 7.30 p.m. Presidential address by Dr. L. Reeve, chief metallurgist, Appleby-Frodingham Steel Company.

Institution of Production Engineers (Manchester Section):—Meeting at Manchester College of Science and Technology, Sackville Street, Manchester, at 7.15 p.m. "Spark Machining and Similar Processes," by K. Appelbee.

Institute of Marine Engineers (West of England Section):—Meeting at the Small Engineering Lecture Theatre, University of Bristol, University Walk, Bristol 8, at 7.30 p.m. "Water Treatment for High-pressure Marine Boilers," by Dr. T. V. Arden and F. C. Blight.

OCTOBER 10

Institute of Marine Engineers:—Meeting at the Memorial Building, 76, Mark Lane, London, E.C.3, at 5.30 p.m. "A Critical Survey of Marine Water-treatment Methods," by I. Raleigh.

Institution of Production Engineers (Doncaster Section):—Meeting at the Technical College, Waterdale, Doncaster, at 7 p.m. "Cold Extrusion," by H. A. J. Dennison.

OCTOBER 11

Institution of Production Engineers (Peterborough Section):—Meeting at F. Perkins, Limited, at 7.30 p.m. "Ball and Roller Bearing Manufacture," by J. Anderson.

North Western Fuel Luncheon Club:—Meeting at the Engineers' Club, 17, Albert Square, Manchester 2, at 12.15 for 12.45 p.m. Presidential address by D. P. Welman, chairman, North Western Gas Board. Annual general meeting at 1.30 p.m.

British Coal Utilization Research Association:—Meeting at the Conway Hall, Red Lion Square, Holborn, London, W.C.1, at 5.30 p.m. Tenth Coal Science Lecture: "The Position of Coal in Electric Power Generation," by L. Rotherham.

OCTOBER 11-13

British Iron and Steel Research Association:—Conference on "Hydrogen in Steel," at Harrogate.

OCTOBER 12

Institution of Plant Engineers (Sheffield and District Branch):—Meeting at the Blue Bell Hotel, Scunthorpe, at 7.30 p.m. "Problems in Rolling Mills," by W. Bailey, chief engineer, Briton Ferry Steel Company, Limited.

OCTOBER 13

Junior Institution of Engineers:—Meeting at Pepys House, 14, Rochester Row, London, S.W.1, at 7 p.m. "The Technician, Education, and Industry," by J. Heywood.

Southern Counties Institute of Mining Engineers:—Annual general meeting at the Institution of Mining Engineers, 3, Grosvenor Crescent, London, S.W.1, at 3.30 p.m. General meeting at 3.45 p.m. Presidential address by D. G. Hemmant.

OCTOBER 14

North of England Institute of Mining and Mechanical Engineers:—Meeting at Neville Hall, Newcastle-upon-Tyne 1, at 2.30 p.m. "The Instrumentation of a Methane Drainage System," by H. S. Shillingford.

Institute of British Foundrymen (Scottish Branch):—Meeting at 2.30 p.m. Presidential address by J. S. McMillan and "Some Non-ferrous Castings for Mining Machinery," by R. Ferguson.

OCTOBER 16

North East Coast Institution of Engineers and Shipbuilders:—Opening general meeting in the Lecture Theatre of the Literary and Philosophical Society, Newcastle-upon-Tyne.

OCTOBER 17-NOVEMBER 8

Iron and Steel Institute:—Special meeting in the United States and Canada.

National Association of Colliery Managers

OCTOBER 17

Yorkshire Branch:—Meeting at Kellingley Colliery at 3 p.m. Visit to the new mine, followed by presidential address by F. Fairclough.

OCTOBER 25

Lancashire Branch:—Meeting at the Manchester Literary and Philosophical Society, 36, George Street, Manchester, at 4 p.m. R. H. Clough, HM Divisional Inspector of Mines, will introduce his report on the North Western Division for 1960.

OCTOBER 27

North of England Branch:—Annual dinner.

Coal Injection for Blast Furnaces

FOLLOWING small-scale experiments, a solid-fuel injection system has been set up on a commercial blast furnace at the Buffalo plant of the Hanna Furnace Corporation, a subsidiary of National Steel. Bethlehem Steel Corporation is also participating in the research venture, according to a writer in Steel (August 28, 1961). The new development, it is claimed, allows a net reduction in the total amount of coking coal used. Despite that, the coal industry will benefit because the technique provides an answer to the competitive threat of natural gas and fuel oil as alternative to other blast-furnace fuels.

Some 10 per cent. of coal was used in the first stage of the experiment, later stepped up to 20 per cent. and to 30 per cent. in the current month. Coal, it is said, replaces coke about ton for ton. Coal for injection is crushed and screened to minus $\frac{1}{4}$ in. size and then conveyed by a vacuum system to an overhead storage tank. The coal is passed under pressure from the storage tank to a charging vessel where it is kept in a fluid condition by compressed-air agitation. Metered quantities of the coal are delivered from the vessel through a system of tubes to stainless steel lances at the tuyeres through which the coal is injected into the blast furnace. The richer gases reaching the hearth area speed reactions.

Supervisor's Handbook and Diary

The 1962 edition of the IWS Supervisor's Handbook and Diary, published by the Industrial Welfare Society, Robert Hyde House, 48, Bryanston Square, London, W.1 (5s.), is packed with facts, figures, and information of practical value to supervisors in all industries. Contents include a guide to decision making, how to write a report, what is personnel management, training within industry, examinations in management and supervisory subjects, accident prevention techniques, company finance, and the law and industry.

Large Walking Dragline

for Open-cast Coal Mining in South Wales

A WALKING dragline which is claimed to be the biggest in the world is being used by the National Coal Board in the open-cast coal workings at Maesgwyn Cap, Glyn Neath. It is a RapieR W1800, made by Ransomes & Rapier, Limited, Ipswich, a member of the Newton, Chambers group, and it cost over £900,000. Operation of this giant machine, weighing 1,800 tons, is in the hands of George Wimpey & Company, Limited, on a contract which involves the stripping of overburden to a depth of 300 ft. to expose and recover anthracite coal of the highest quality.

With a bucket weighing 33 tons and having a maximum load capacity of 40 cu. yd. or about 60 tons, it will be able to take huge "bites" at the overburden. The boom, which is of lattice girder construction in high-tensile steel, was made by Newton, Chambers & Company, Limited, Thorncliffe, Sheffield. Its basic length is 208 ft., but there are two extensions which permit two operating lengths—282 ft. with a 30-cu. yd. bucket and 247 ft. with a 40-cu. yd. bucket. The radius of discharge (vertical) with the longer boom is 260 ft. and with the other 230 ft. Maximum allowable working load at maximum radius is 65 tons with the longer boom or 91 tons with the shorter boom.

Being of the cantilever type, the boom is suspended in its operating position by a structural steel suspension member connecting the apex of the boom to the gantry head. Derrick ropes and derricking gear are provided only for raising and lowering the boom and do not carry any load during the normal operation of the machine.

Base Structure

The base structure of the RapierR W1800 is 55 ft. dia. and is built up of rolled-steel plates and sections, which give the necessary strength and rigidity for digging and walking duties. The rotate frame is made up of rolled-steel plates and flats welded to form four full-length longitudinal girders 14 ft. deep into which are built the circular girders for carrying the roller path which is made of special nickel chrome molybdenum cast-steel segments of bridge type rail section. The roller circle consists of a 48-ft. dia. live ring made up of 125 alloy steel taper rollers mounted in a structure frame. A welding set operating on 440 V three-phase supply, and capable of 200 A continuous and 300 A intermittent hand-welding service, is provided for maintenance and for emergency repairs.

While digging, the RapieR W1800 sits on its circular base, which has an area of 2,380 sq. ft., and when it is required to move as work proceeds, or from one part of the site to another, it does so through the operation of a walking mechanism for which

THE RAPIER W1800, THE BIGGEST WALKING DRAGLINE IN EUROPE, AT WORK AT THE OPEN-CAST COAL SITE AT MAESGWYN CAP, GLYN NEATH, SOUTH WALES.

Ransomes & Rapier holds the patents. On each side of the excavator there is a rectangular walking "shoe" attached to a leg structure. The walking operation is carried out by placing the shoes on the ground and lifting the entire machine forward so that by means of the eccentric on which each leg is mounted it moves across the ground, taking 7-ft. 7-in. walking strides.

The dragline has eight 300-h.p. motors, four of them for hoist and four for drag; also fitted are four 225-h.p. "walk" motors and four more 225-h.p. "swing" motors. The machinery house has a crane gantry on which runs an electric overhead crane with two 10-ton crabs. These are for maintenance purposes and can handle all machinery. The machine is designed with a view to ease of handling and speed of operation, being entirely electrically driven with Ward-Leonard Amplidyne control.

The movements of the W1800 while digging and walking are controlled by one driver, operating from either of two glass-fronted control cabins, one in each side of the superstructure. There are identical control consoles in these cabins each containing master controllers for the hoist, drag/swing, and walk motors as well as the necessary control switches for the operation of the excavator. Windowscreen wipers keep visibility clear and the cabins are heated as required for the comfort of the driver. Between the two cabins a gallery extends around the front circular girder of the superstructure and from this gallery a clear and uninterrupted view of all the digging and hoisting operations can be obtained.

Erection of the Dragline

The erection of the machine was done on the site at Glyn Neath by the outside erection department of Newton, Chambers & Company. The first task on the Maesgwyn Cap mountain side was to prepare a plateau of solid ground and the first erections which followed were of a workshop, canteen, and drying rooms. The area is notorious for heavy rainfall and the site was three miles from the nearest village. Some 40 men were employed on the erection and the work took over a year. In the winter months arc lights were installed to allow operations to go on after dark.

Another RapieR W1800 is nearing the final stages of erection at Roxby, near Scunthorpe, for the United Steel Companies, Limited, which has had a RapieR W1400 (from which the W1800 has been developed) working in its open-cast ironstone mine at Exton Park (Rutland) since 1957.

NEGOTIATIONS ARE REPORTED to be taking place between the Government of the State of Guanabara and the Krupp group of western Germany for the installation of a US $250,000,000 steel plant near Rio de Janeiro. The plant, with a production capacity of 500,000 tons a year, would be financed jointly by Krupp and Brazilian official and private investors. It is expected that the State of Guanabara would hold half of the share capital.

Dust Suppression on Anderton Shearers

CONSIDERABLE difficulty has been experienced in applying standard dust-suppression measures to Anderton shearer loaders since the operating conditions and the nature of the dust problem vary from pit to pit. The object of Information Bulletin 61/229, recently published by the production department of the National Coal Board, is to present a choice of various methods which have been devised specifically to deal with local conditions, including diverse arrangements of sprays, shrouds, or cowls attached to the machine.

For the purpose of clarity, illustrations of the various techniques show only the location and the method of mounting the necessary equipment on the machine. In practice, the detailed positioning of all water-supplying piping, sprays, etc., must be made with due regard to local conditions.

For instance, where there is a tendency for sprays disposed along the top of the machine to become covered with falling coal, the pipes should be moved towards the face edge of the machine.

Gumstower Cleaner Bar

NEW type of cleaner bar for AB coal-cutting machines fitted with AB gumstowers has been designed by Mr. D. M. Parkes and Mr. G. Gregory, of the National Coal Board's East Midlands Division. The device helps to improve the quality of slacks, the percentage production of large coal, and the system of eliminating dirt from the undercut.

The cleaner bar is fitted tightly to the ingoing chain of the machine so that the chain picks up any gummings from the cleaner bar, carries them round the tip of the bar, and back into the gumstower. In this way the bar is made to fit within 3 in. of the back of the cut, without loss of speed by the machine.

The bar is secured to the bottom of the gumstower by two bolts. A rider is situated near the tip to prevent the flange of the bar from catching on irregularities in the floor and causing the bar to be bent.

A CONFERENCE on international developments in heat transfer arranged by the Institution of Mechanical Engineers, the American Society of Mechanical Engineers, and the Institution of Chemical Engineers, is to be held in London from January 8 to 12, 1962.

HIGHLIGHTS OF a lecture-demonstration by scientists of the Bureau of Mines, US Department of the Interior, on fire and explosion hazards of flammable materials are given in Information Circular 8,005, "Flammable Materials: a Lecture Demonstration," obtainable from the Publications-Distribution Section, Bureau of Mines, 4,800, Forbes Avenue, Pittsburgh 13, Pa. As published, the lecture-demonstration is suitable for use either as a guide for an instructor or for home reading by persons concerned with storing, handling, and shipping of what the Code of Federal Regulations calls "dangerous articles."

Mining Oversea

in which we review, from time to time, interesting mining matters reported by our contemporaries abroad

INFUSION PROPERTIES OF COAL

RESEARCH has been carried out by the Moscow Mining Institute on the infusion properties of coal in certain collieries of the Karaganda coalfield. During the field tests, the dust concentration at the coal face fell to between 50 and 80 per cent. during the operation of the Donbass cutter loader, and the moisture of the coal rose by 1 to 2 per cent. The water consumption per ton of coal amounted to 1½ to 2 gal. The Felix filtration coefficient was found to be 5×10^{-6} ft./min. The optimum value for the water pressure was established as 450 to 500 lb./sq. in. and that for the water consumption as 0.7 to 1 gal./100 ft. of effective length of infusion hole. The movement of the water through the pores of the coal in the seam was found to follow a linear law.

The tests have led to the establishment of a procedure for the determination of the filtration coefficient and other infusion parameters which can be used to predict the infusion properties of other coal seams.—Ugol, February, 1961.

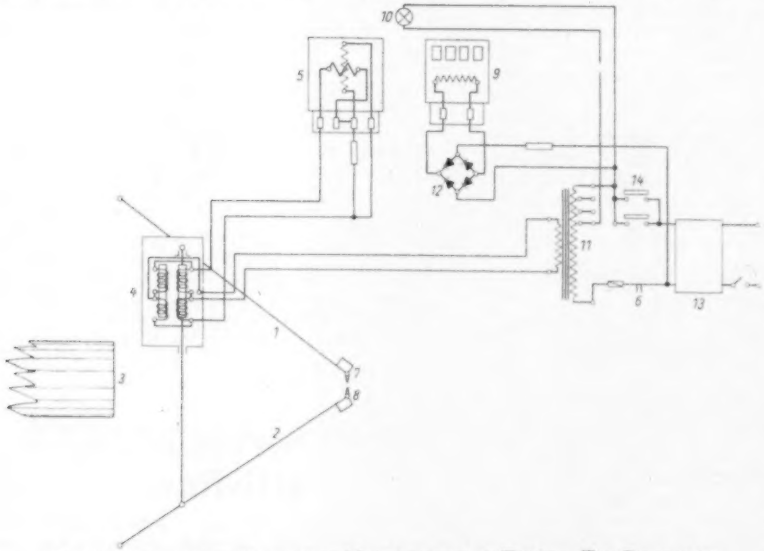


FIG. 1.—CIRCUIT FOR ELECTRONIC MEASUREMENT OF TIMBER. THE REFERENCE NUMBERS RELATE TO:—

1 and 2, feelers. 3, round timber. 4, inductive detector unit. 5, single-phase meter. 6, contact of belt conveyor starter. 7 and 8, limit switches. 9, impulse counter. 10, signal lamp. 11, transformer. 12, rectifier. 13, voltage stabilizer. 14, limit switch contacts.

HEADING MACHINES IN THE RUHR

COLLIERIES of the Oberhausen group have used the 4-JCM continuous miner for their gateroads for some time. A Dosco miner has also been used by another colliery, but this cannot cut the 15-ft. wide headings from one setting, so that its daily advance is only 64 to 82 per cent. of the 4-JCM. A Russian heading machine, type PK-3, has also undergone extensive field tests.

As neither overload clutch nor shear pin are incorporated, the gearing was damaged several times when hard strata were accidentally contacted. Its height, also, makes it unsuitable for headings in seams of less than 6 ft. 6 in. thick, and, due to its limited lateral reach, two settings are needed for a 15-ft. wide heading.

The Marietta miner has not been tested in the Ruhr, but its limited reach and difficulties in hard coal do not make it a serious competitor. To reap the full benefit from any heading machine, the machine must be able to drive 15,000 to 17,000 ft. of heading per year.—E. BORGES, Glückauf, June 7, 1961.

AUTOMATIC STOCKTAKING IN TIMBER YARDS

IN order to eliminate manual ways of measuring and calculating the cubic measurement of round timber in the colliery timber yards, a Russian research institute has developed an electronic instrument (Fig. 1) in which the timber travels on a belt between two feelers. This causes the core of a solenoid to move by an amount which is proportional to the diameter of the timber and this is amplified, multiplied by its length, and automatically recorded.

During the field tests, timber from 7 in. to 2 ft. 8 in. dia., and from 8 ft. to 21 ft. length was measured with an accuracy of 0.2 to 0.4 per cent. compared with a manual check.—REUTHER, Glückauf, April 26, 1961.

A NEW RECORD output for an open-hearth furnace of 250,222 metric tons in a year is reported to have been reached at a steelworks in the Ukraine in 1960, according to Stahl und Eisen. Natural gas and oxygen were used in the furnace.

New Development in Industrial Flooring

MANY industrial undertakings have to face expensive repair or resurfacing of floors or working areas damaged by the passage of vehicles and the movement of people, while the use of chemicals, fats, greases, sugar syrups, etc., not only destroys usual floorings but also creates danger to employees. Provision of a flooring material that will withstand the hazards associated with industrial premises is the purpose of "Maximent," now being made generally available by the surface coatings division of Burt, Boulton & Haywood, Limited, Belvedere (Kent).

"Maximent" is a liquid dressing, applied over a prepared base. The base consists of a screed of, preferably, 3:1 sand cement, properly laid and dried, followed by the application of a special primer. This takes only a few hours to set up before the finish coat is applied. This, in turn, takes only a matter of hours to set up and normally the area can be in regular and permanent use again the day after the finish coat has been laid. The combination of the correct base and correctly applied "Maximent," it is claimed, provides a flooring that could easily last the lifetime of the building. "Maximent" is easily applied and does not call for specialized skilled labour. By applying it over a measured area, it finds its own level and sets without brush or tool marks. At a usual thickness of only $\frac{1}{16}$ in. it provides a surface very many times stronger and more durable than granolithic concrete.

Resistance to Chemicals

A representative of IRON AND COAL was given a practical demonstration of the application of "Maximent" and was able to compare its strength with that of other substances. Whereas stiletto heels on conventional linoleum showed permanent damage to the floor, on a "Maximent" surface there was only slight marking and that was easily polished away. Heavy weights were dropped on a concrete slab treated with "Maximent." Even when the slab finally broke there was no damage to the "Maximent" itself. Wire brushes moved over concrete caused dusting-up and abrasions, whereas "Maximent" remained virtually unaffected by the same treatment. The resistance of "Maximent" to a variety of chemicals, including acids, which would destroy other materials, was a further convincing test of its value.

There was also a display of the various finishes to be achieved with "Maximent"—from the incorporation of a special aggregate to give a grip finish that is invaluable for slopes, treads, and other danger spots—to attractive colours and marble effects that extend its use to commercial buildings, shops, stores, banks, and, indeed, the home.

Although the application of "Maximent" calls for no special knowledge, the company's technical staff is prepared to advise on any special application a potential user may have in mind. The cost of applying the compound over an area of between 200 and 300 yd. is about 30s. per sq. yd., but this cost is reduced when a bigger area is involved.

World Ore Carriers

UNITED STATES iron-ore imports this year have been far below the 1960 level. In spite of this, specialized ore carriers have been fully employed because of additional European and Japanese demand. These changes in the world ore trading pattern are documented in the latest Westinform report, "The Ore Carrier Fleet, Mid-1961." An analysis of the movements of 273 vessels for the 12 months ending June, 1961, shows the spectacular development of opportunities for ore carriers to Japan. Over 5,000,000 deadweight tons of ore carriers unloaded there, compared with 1,400,000 tons in the first half of 1960. The reduction in US imports due to slackness in the steel industry has had a big impact on tonnage trading from Peru and Venezuela. On the other hand, European needs have increased trade from some South American sources, particularly Chile.

New buildings during the last 12 months totalled 737,000 deadweight tons, well below the previous year's level, and this decline is expected to continue, as only 1,085,500 tons of ore carriers are now on order. This is no surprise, as half of the present fleet has been built since 1958, and demand and supply are more or less in equilibrium. The present fleet is by no means wholly employed in ore. One hundred vessels carried at least one cargo of another commodity, including (rather surprisingly), 41 which lifted cargoes of grain.

Copies of the report (£2, plus postage) are available from W. G. Weston, Limited, 27, Cockspur Street, London, S.W.1.

Annual Survey of NEL's Activities

RESULTS of research on machine tools, ball-bearings, fatigue at high temperatures, and extrusion of metals are some of the items of direct industrial interest included in the annual report for 1960 of the National Engineering Laboratory, which has just been published (Stationery Office, 15s. net).

Background research forms an important part of the laboratory's work. The report gives details of the first stages of the synthesis of very hard materials (small diamonds were produced recently at NEL); the preparation of new steam tables; the lubrication of gears; and the fracture of metals under combined creep and fatigue. An account is also given of new research facilities, including a master gear-generating machine, equipment for calibrating gas and oil flow-meters, and rigs for testing the performance of fans. Sponsored work for individual firms has ranged from noise measurement in a factory to efficiency tests on a water turbine.

ISI Special Meeting in the USA and Canada

Sparrows Point Plant of

BETHLEHEM STEEL COMPANY

Opportunity to inspect the Sparrows Point plant of the Bethlehem Steel Company will be afforded members of the Iron and Steel Institute during the forthcoming special meeting in the United States and Canada. This plant is an important part of the company, a fully integrated and widely diversified organization with a capacity for making 23,000,000 tons of steel a year.

OPERATIONS of the Bethlehem Steel Company include the mining of raw materials, iron and steel making, shipbuilding, and the manufacture of a large variety of steel products, ranging from structurals to forgings.

AN early milestone in the company's history was the introduction of the wide-flange section. A recent milestone is its use of vacuum casting for forging and alloy steels.

EARLIER this year the company claimed to have carried out the largest vacuum pour to make an ingot weighing 260 short tons for forging to a single-piece generator rotor.

BLAST-FURNACE SILHOUETTE AT SPARROWS POINT.

OTHER main plants of Bethlehem Steel include the Bethlehem plant (Bethlehem); the Lackawanna plant (on Lake Erie), the fourth largest steel plant in the USA; the Johnstown plant (Pennsylvania); the Steelton plant (Steelton, Pa); the Lebanon plant (Lebanon, Pa); the Williamsport plant (Williamsport, Pa); the supply division (Tulsa, Okla.,), which manufactures oil equipment; the Buffalo tank division (Buffalo), which manufactures containers, hoppers, etc.; the Pacific Coast division, operating three steel plants in the Far West (South San Francisco, Los Angeles, and Seattle); steamship lines for the transportation of iron ore and steel products and including 21 ocean-going ships and 15 ships operating on the Great Lakes; the shipbuilding division, operating 11 shipyards for building ships varying in type from small barges to naval vessels.

Finally, in addition to research facilities at its

DISCHARGING COKE FROM THE OVENS.

various plants, Bethlehem Steel has a large central research laboratory on a 1,000-acre site adjacent to the campus of Lehigh University, Bethlehem, Pa.

Historical Note

The land on which the Sparrows Point plant stands was deeded by Lord Baltimore to Thomas Sparrow in 1652. Some 230 years later the Pennsylvania Steel Company, with its plant at Steelton, Pa., selected Sparrows Point as a site for a blast furnace to use foreign ores in making the pig-iron needed at Steelton for steel rail production. Before the original Sparrows Point plant could be completed this plan had been modified, so that Sparrows Point became a steel producer in its own right. The plant poured its first pig-iron in 1889 and two years later made its first heat of Bessemer steel, which was rolled into rails.

To meet the mounting demands, Bethlehem had to increase its capacity and in 1916 it acquired the Pennsylvania Steel Company; this single move, giving Bethlehem the added facilities of the Sparrows Point plant and the Steelton plant, nearly doubled its steelmaking capacity.

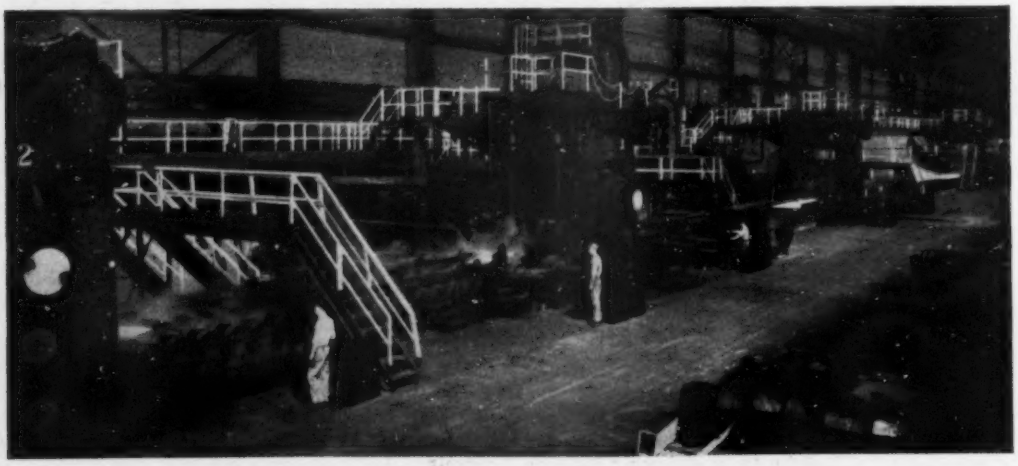
In the early '20s a long-range programme of modernization and expansion was started at the Sparrows Point plant. Little of the original plant has survived: the range of products has broadened and modern automatic and continuous equipment has replaced the older type mills.

Bethlehem-Sparrows Point Shipyard, Inc., is also at Sparrows Point: this is one of the few places in the world where a steel plant and a shipyard are adjacent. Ironically, at Fairfield, the Patapsco Scrap Corporation, operated by the company, dismantles old vessels and supplies scrap to the open-hearth furnaces at Sparrows Point.

In times of normal operation the Sparrows Point plant employs 29,000 people. Approximately 37,000 are engaged in all of the Bethlehem activities in the Baltimore area.

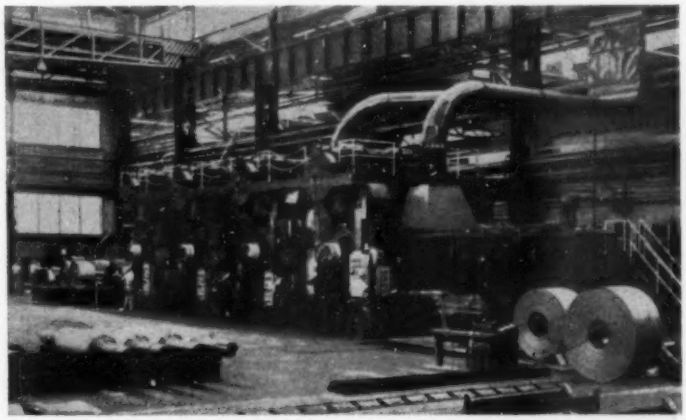
Large Integrated Steel Plant

When acquired by Bethlehem Steel in 1916 the Sparrows Point plant consisted of four 200 ton/day blast furnaces, five 50-ton open hearths, four 10-ton Bessemers, and a rail mill. Today, after the completion of the expansion programme of the late 1950s, the Sparrows Point plant is the largest in the world with an annual ingot capacity of 8,200,000 tons from 35 open hearths and a Bessemer converter supplied by 10 blast furnaces.



FOUR OF FIVE ROUGHING STANDS IN THE 68-IN. CONTINUOUS HOT-STRIP MILL.

This large integrated plant is sited on tidewater and is thus well placed for receiving the vast tonnages of raw materials it requires. Iron ore comes principally from South America and Labrador. Its annual coal usage of about 5,000,000 tons depends on transportation by land and sea from the mines in Pennsylvania and West Virginia. Scrap comes principally from the Patapsco Scrap Corporation's plant referred to above.



FOUR-STAND 66-IN. COLD-REDUCTION MILL.

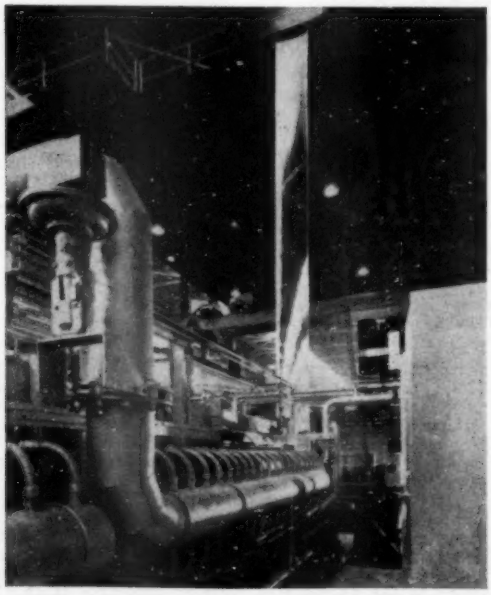
Coking

With the completion, four years ago, of a battery of 65 undejet ovens, the plant now has 12 coke-oven batteries having a total of 687 ovens.

Ironmaking

There are 10 blast furnaces. The 10th in the line, K furnace, which was blown-in in 1957, has a hearth diameter of 28 ft. 9 in. Height, from taphole to top of furnace, is 105 ft. and its total volume is 58,274 cu. ft. The other furnaces are also large, Bethlehem having established a record with a 28-ft. dia. furnace in 1948 when its H furnace produced 54,336 tons in a month, an average of 1,753 ton/day.

Ore storage totals 1,500,000 tons and there is an adequate screening station and conveyor system.



THE COOLING TOWER ON THE FINISHING END OF THE CONTINUOUS GALVANIZING LINE.

Four 6-ft. wide, 110-ft. long sintering strands were added in 1958 to make a total of six strands with a total capacity of 340,000 ton/month.

Steelmaking

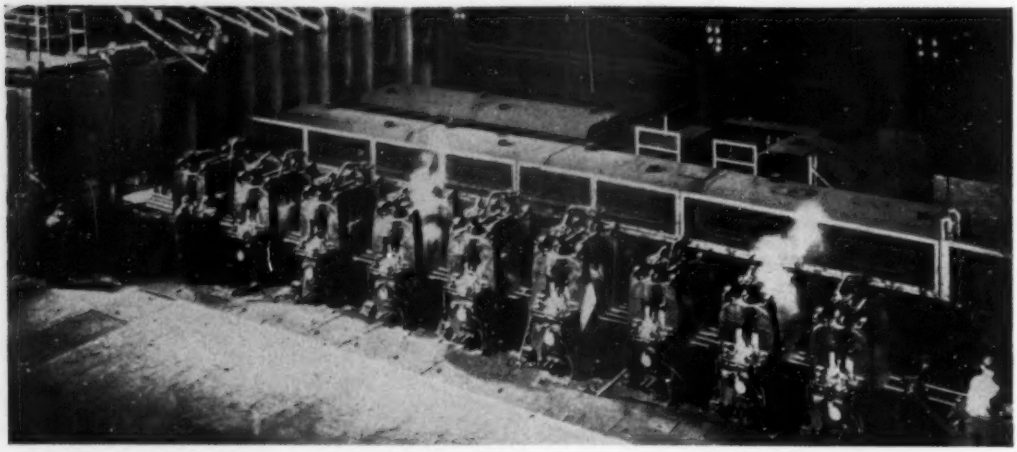
There are four open-hearth shops. The Nos. 1, 2, and 3 shops account for about 6,000,000 ton/annum and the No. 4 open-hearth shop, part of the company's 1956 expansion programme, has an annual capacity of 2,000,000 tons. This shop is located between Nos. 3 and 4 open-hearth shops and has a stripper building, mould preparation building, ladle house, and shares a dolomite system and stockyards with No. 3 open-hearth shop.

This modern open-hearth shop has seven fixed furnaces rated at 350-ton, measuring 104 ft. by 29 ft. with seven doors 5 ft. 8 in. square. Slag pockets, 22 ft. by 20 ft., lead into the two-pass regenerator system. Each chamber of the first pass is 13 ft. 9¼ in. wide by 22 ft. 9 in. long inside the brickwork, and each chamber of the second pass is 13 ft. 9¼ in. wide by 15 ft. long. The height of the regenerater from floor to floor is 30 ft. 1⅛ in. inside the brickwork.

Furnace design is fairly conventional with sloping backwall, water-cooled buckstays and door frames. The steel bottom plate has first a lining of 1½-in. chrome ore, then 18 in. of magnesite brick laid in inverted arch design, and then 18 in. of rammed magnesite. Five of the seven furnaces have basic port ends, the other two having silica brick. Roof construction is 13½ in. super duty silica brick in bonded formation. Metal depth for a 350-ton heat is 29 in. at the centre line of the furnace. Hearth area, inside the brick at the door sill level, is 1,271 sq. ft.

Flushing is through door No. 4, the slag being dropped onto the floor at pit level and, after cooling, loaded into trucks. Ladles, designed to carry 385 tons of steel, are of welded and riveted construction.

The pouring bay has the largest pit crane ever built. It is designed to handle 500 tons on its main



FOUR-STRAND ROD MILL.

hooks and has two auxiliary hooks, one of 75 tons and the other of 25 tons.

The furnaces each have a single-pass horizontal fire-tube boiler with superheater. The induced draught fan is rated at 300,000 lb. of waste gas/hr. at a temperature of 290 deg. C. and a pressure of 12 in. water gauge. Combustion air is delivered to the furnace by a forced-draught fan capable of delivering 50,000 cu. ft./min. of air at temperature of 35 deg. C. against a pressure of 6 in. water gauge. One water-cooled burner is used at each end of the furnace. It is designed to burn oil and gas or tar and gas and has a maximum firing rate equivalent to 1,500 gal. of oil/hr.

Slab, Plate, and Sheet Mills

The main rolling facilities include two blooming mills of 40 in. and 54 in.; two slabbing mills of 40 in. by 80 in. and 45 in. by 90 in.; two plate mills 60 in. and 160 in.; two strip mills, a 56-in. and 68-in. and a 66-in. four-stand cold-reduction mill.

Strip is coated either in a galvanizing line or one of the three electrolytic tinning lines.

Pipe Production

The pipe mills include a modern electric pipe weld mill having a capacity of 20,000 ton/month and capable of producing pipe in sizes from 4½ to 16 in. outside dia. and up to 60 ft. long.

Rod and Wire

Rod and wire facilities include a four-strand mill which, in addition to rolling rods for wire drawing, also rolls bar for reinforced concrete. There are many continuous wire-drawing machines and much of their product is processed at Sparrows Point to nails of many types and sizes. Some wire is also zinc coated electrolytically.

• *Acknowledgment is made to the Bethlehem Steel Company and to the editor of the Iron and Steel Engineer for providing information and illustrations.*

GAS IN THE FOUNDRY

FOR many years enlightened foundry managers have been using town gas for a number of processes in their foundries. In recent years the solution to many problems arising from the introduction of new techniques, the desirability for higher quality production and the passing of the Iron and Steel Foundries Regulations, 1953, has been found by the increased use of gas. Gas is a clean, reliable, and flexible fuel which lends itself readily to precise and automatic control. The products of combustion contain neither smoke nor any objectionable quantity of sulphur and for many processes the ability to apply a clean flame directly where required has many advantages.

The Iron and Steel Foundries Regulations, 1953, prohibited the use of flueless solid-fuel braziers or stoves for a number of processes, including heating or drying ladles, drying moulds, and for heating workrooms in ferrous foundries. The Joint Standing Committee on Safety, Health, and Welfare Conditions in Non-ferrous Foundries made similar recommendations for non-ferrous foundries and advocated the use of gas for mould drying and ladle drying.

Developments are continuously being made both by industrial gas appliance manufacturers and by the Gas Boards themselves in the design of equipment for foundries as well as for many other industries. It is the object of a brochure issued by the Gas Council to bring to the attention of foundry personnel some of these developments in the application of gas to the foundry.

New Literature

READERS wishing to obtain a copy of any of the house magazines, catalogues, pamphlets, and other publications referred to below should write direct to the address given, at the same time mentioning this journal.

ENGINEERING AND BUILDING CENTRE, Stephenson Place, Birmingham 2—Latest information concerning the new centre, which is to be opened next March, is included in the August-September issue of News Letter.

PARKINSON COWAN INDUSTRIAL PRODUCTS, Dolphin Works, Fitzalan Street, London, S.E.11—Now available is an eight-page illustrated colour brochure giving details of lighting, operating, and temperature settings for Parkinson Cowan gas-fired radiant heat panel ovens.

JELTEX, LIMITED, Green Lane, Hounslow (Middx)—A pamphlet gives details of the Jeltek safety jerkin, which fulfils the need for a garment that is readily visible in darkness and provides the wearer with added protection in bad weather. Made from a white p.v.c.-coated heavyweight material, the jerkin has a 9-in. square of reflective fabric built into the back and a 1-in. strip around each shoulder.

CONTROLLED HEAT & AIR, LIMITED, Cornwall Road, Smethwick, Birmingham—"Industrial Ovens and Filtration Equipment" is the title of a new brochure (No. CHAL 14). The company designs and manufactures industrial ovens covering the whole field of stoving, drying, low-temperature heat treatment, etc., up to a maximum of 450 deg. C. Various examples of the equipment are described and illustrated.

PADLEY & VENABLES, LIMITED, Dominion Steel and Tool Works, Callywhite Lane, Dronfield, Sheffield—A four-page illustrated brochure (No. R.F.6.61), "Correct Heating Methods for the Re-forging and Hardening of Breaker Steels," clearly differentiates between the correct and the incorrect methods. A page is devoted to a description of the "Easibust" breaker steel. It is stated: "Phenomenal performances have been achieved by 'Easibust' users all over the world, one Belgian customer reporting an average life of 12 hr. without resharpening—and this under conditions where the average life of conventional steels was only 30 min."

STEEL, PEECH & TOZER (branch of the United Steel Companies, Limited), The Ickles, Rotherham—The Phœnix Gazette (2d.) is very largely devoted to news of the company's personnel—at work and at play. But also included in the September issue are two or three short articles, one of which is a review of Britain's trading position in the second quarter of this year. Two of the works councillors, L. Gambles and G. Gold, attended an Industrial Mission weekend conference in June, and they admit that they "set forth to this conference not entirely without some form of mistrust and doubt." In an interesting article on their experiences at Whirlow Grange, they state that their "mistrust and doubts and their preconceived ideas were entirely wrong."

THOS. FIRTH & JOHN BROWN, LIMITED, Atlas Works, Sheffield 4—Fifty years ago, in January, 1911, Thos. Firth & Sons tapped its first heat from a 30-cwt. electric arc furnace. This was at a time when it was estimated that in all the steelmaking countries of the world only 51 electric arc furnaces were actually in operation, and production of electric steel in this country was too insignificant to be included in general statistics. Reference to the event is made in "Half a Century of Progress)" in the autumn number of Firth Brown News (3d.). The issue contains several other short articles on steel industry topics and a great deal of news and views, brightly presented, concerning employees of Thos. Firth & John Brown, Limited, and Firth-Derihon Stampings, Limited.

DONCASTER AND DISTRICT MINING SOCIETY, Technical College, St. George Gate, Doncaster—The 1960-61 Transactions of the society (Vol. 26) are now published (7s. 6d.). The following papers are included:—"Fast Moving Faces," by Frank Fairclough, M.I.Min.E., Area production manager, No. 5 Area, North-Eastern Divisional Coal Board; "Dust-suppression Equipment on Power-loading Machines," by W. T. Alberry, assistant divisional safety engineer, North-Eastern Divisional Coal Board; "Layering of Firedamp in Coal Mines," by E. J. Raine, B.Sc., M.I.Min.E.; "The Huwood Hydraulically Propelled Buttock Loader," by P. Turner, B.Sc.(Min.), A.M.I.Min.E.; "Thin Seam Mechanization," by John M. Bennett, B.Eng.(Hons.), A.M.I.Min.E. Notes on visits made during the year and other information are included.

VICTOR PRODUCTS (WALLSEND), LIMITED, Wallsend-on-Tyne—"I am not sure what being a part of the Common Market will do for us, but I am much more certain of what will happen to us if we are not members," says R. W. Mann, managing director, in an article in the September issue of Victor Magazine. He continues: "With the demand of underdeveloped countries for manufacture by themselves, with the protective tariffs being levied against us by our Commonwealth countries, it is obvious that our production and our own capacity to provide employment must fall if we do not find enough outlets for our products. I believe the Common Market will provide such a market. I am not frightened of the competition we shall meet." L. R. Mann, the company's chief engineer, is the author of an article on "Temperature Management," one of a number of interesting features in the magazine.

APPLEBY-FRODINGHAM STEEL COMPANY (branch of the United Steel Companies, Limited), Scunthorpe (Lincs)—The technical article in the autumn number of Appleby-Frodingham News (3d.) describes the working of the tonnage oxygen plant, which was commissioned last January and started pumping oxygen through the feeder lines to the melting shops. The plant can produce up to 100 tons of 99.5 per cent. pure gaseous oxygen per day, which is equivalent to a flow of 110,000 cu. ft./hr. As an alternative, the plant can supply 90 tons of oxygen per day for the steel furnaces, and make 10 tons of liquid oxygen to be stored at the plant as a reserve which can be drawn upon when the plant has to be shut down for maintenance. The remaining contents of this excellent magazine cover a variety of subjects—"Man and the Universe," "The Fascination of the Universe," "Alice in Motorland," and many more designed to appeal to a wide readership.

BRITISH CAST IRON RESEARCH ASSOCIATION, Alvechurch, Birmingham—The following reports are printed in the September issue of the BCIRA Journal, which is circulated on an annual subscription basis:—"Effect of Compostion on the Liquidus and Eutectic

Temperatures and on the Eutectic Point of Cast Irons," by Dr. J. G. Humphreys, B.Eng.; "How to Estimate Cupola Metal Composition by Means of Cooling Curves," by R. Jelley and Dr. J. G. Humphreys; "Properties of Hot Box Core Binders," by D. A. Taylor and M. J. Clifford; "Diamond Pyramid Hardness Impressions on Chilled White Irons," by W. J. Williams, M.Sc.; "Effect of Heat Treatment on Tensile and Impact Properties of High-strength Nodular Cast Irons," by B. R. Douglas, A.I.M., and G. N. J. Gilbert, A.M.I.Mech.E., A.I.M.; "Production and Properties of Nodular Graphite Structures in Heavy Section Castings," by R. Barton, B.Sc.; "Measurement of Gas Evolution from Core Sand on Heating," by R. G. Godding; "Effect of Superheating on Chill and Mottle Formation," by A. G. Fuller, M.Sc.

DISTINGTON ENGINEERING COMPANY, LIMITED, P.O. Box 8, Workington (Cumberland)—The company's works is situated on the west Cumberland coast, adjacent to the docks and harbour of Workington. Good road, rail, and harbour facilities help the company to reach easily both home and oversea markets. A member of the United Steel Companies, Limited, Distington, started as an ironfoundry and engineering works in 1946 and has since developed into one of the largest modern ironfoundries in Europe, specializing in the production of ingot moulds, bottom plates, and slag ladles. The plant consists of three manufacturing divisions—the ironfoundry, the steel fabricating shop, and the machine and assembly shop. All its resources are co-ordinated in a modern production-flow system which ensures not only economic and efficient handling but a product of high quality and long life. The main works building consists of five bays, each a quarter of a mile long. An elegant 36-page publication (No. DEC 4) has been produced to describe the foundry, which occupies approximately two thirds of the plant and was the first ingot mould foundry in Europe to achieve a production of more than 2,800 tons of finished castings per week. Many of the photographs are in colour and, altogether, the publication is an excellent guide to the foundry.

INSTITUTION OF METALLURGISTS, 4, Grosvenor Gardens, London, S.W.1—In "The Metallurgist in the Heavy Steel Industry," an article published in the September number of the Metallurgist, the author, L. Reeve, who is chief metallurgist of the Appleby-Frodingham Steel Company (branch of the United Steel Companies, Limited), has concentrated on the quality control and development sections of the metallurgist's work. As he says: "A completely fresh paper could be written to cover the type of work which the production manager encounters, which has common frontiers with, or overlaps, that already described, and in which many metallurgists have made their mark." Mr. Reeve continues: "Whichever type of work he chooses, the new entrant must expect, of course, his share of disappointment and failure, for not all problems have a final and happy outcome. He must also expect his share of inevitable day-to-day routine. But the writer hopes that the final picture he has left with the reader is that of an active and vital industry with ample scope for the application of scientific principles in which the young metallurgist can expect to find interesting and rewarding work in many fields to suit his particular abilities and ambitions." The issue also contains an interesting article by Harold Moore on "Metallography—Ancient and Modern."

Hydrostatic Extrusion Developed at NEL

NEW method of extrusion developed by the DSIR's National Engineering Laboratory gives products with more uniform mechanical properties and requires much lower pressures than the conventional process. Extrusion pressure is applied hydrostatically without any direct contact between ram and billet. Tests of the process have so far been restricted to pure aluminium and an aluminium alloy, but the laboratory is taking the work a stage further by investigating the cold extrusion of other metals, especially steels.

In the new process a cone is machined at one end of the billet so that it fits closely into a die with a conical entry. The die forms the exit from cylindrical high-pressure chamber containing a liquid, such as glycerine, castor oil, or a dispersion of molybdenum disulphide in oil. The other end of the chamber is closed by the ram of a hydraulic press. As the ram moves into the chamber, pressure builds up in the liquid, which transmits the extrusion pressure to the billet. The material is extruded through the die without any direct contact between ram and billet. The fluid acts as an efficient lubricant and makes it possible to use conical-entry dies with very small die angles.

In addition, the nosing of the billet reduces the amount of work expended in deforming the metal and hence the maximum extrusion pressure required. Reductions in extrusion pressure of 30 to 40 per cent. have been obtained in the laboratory tests. With pure aluminium, the maximum extrusion pressure for the production of rod at an extrusion ratio of 7, through a conical-entry die with a 20 deg. included angle, was 17 ton/sq. in. compared with a pressure of 32 ton/sq. in. for a conventional extrusion through a square-entry die. With the alloy (0.7 per cent. magnesium, 1 per cent. silicon, and 0.7 per cent. manganese), the pressure was 29 ton/sq. in. compared with 43 ton/sq. in. by conventional methods. All these figures are for extrusion from an unheated billet. The distribution of hardness over the cross-section of the extruded rod was much more uniform than usual, and this will often be an important advantage. These results suggest that cold extrusion of high-strength materials will be possible.

PRODUCTION of Pennsylvania anthracite totalled 18,800,000 net tons in 1960, a decline of 9 per cent. on 1959.

A BRUSSELS REPORT states that production of silico-manganese steel is to be started by the Man Industrial Corporation in India next year. The initial output of about 12,000 tons per annum will be doubled later. The company is also planning to extend its existing rolling mill at Jaipur.

COAL PRODUCTION AND SAFETY IN THE EAST MIDLANDS

HM Divisional Inspector's Annual Report

INCREASED continuous effort is needed if the coal industry is to get away from the position of stalemate with regard to reduced accidents, states Mr. H. S. Stephenson, HM Divisional Inspector of Mines and Quarries for the East Midlands, in his annual report for 1961 under the Mines and Quarries Act, 1954 (HMSO, price 3s.). Forty-one persons were killed and 207 seriously injured, compared with 28 killed and 236 injured in 1959. While the number killed is very much greater than in 1959, the Inspector points out that it is more nearly the average of the three preceding years.

The introduction of compulsory retirement for persons reaching the age of 65 during 1960 was reflected in a reduction of bulk output from the 88 collieries and 13 small mines licensed by the National Coal Board. Total output was 44,064,770 tons, compared with 44,877,472 tons in 1959.

Developments in the Division

Outlining the principal developments during the year, the Inspector states that the number of power loading units in the mines increased gradually and at the end of the year some 320 machines were in production. The percentage of coal from mechanized faces rose from 54.09 in 1959 to 59.80 in 1960. Further, the overall output per manshift increased from 40.63 cwt. in 1959 to 42.11 cwt. during the year under review. Officials and workmen alike, it is stated, have every reason to be proud of this result.

As in previous years, a considerable amount of new and reconstruction work was undertaken and in this connection tribute is paid to the technical skill, and sometimes considerable ingenuity, displayed in planning and completing these schemes. Some of the major developments during the year are mentioned below. At Glapwell, Newstead, and Whitwell collieries new electric winders were commissioned. At Blidworth Colliery work is proceeding on a reorganization scheme which includes the installation of a new fan and the making of a new mine-car underground circuit.

At Clipstone Colliery a new coal-preparation plant has been completed, and underground development is proceeding in preparation for the introduction of large mine cars. An underground mine-car circuit is under construction at Shirebrook Colliery where a new headgear and winding engine house should be completed in the current year. The result of this will be the winding of 5-ton capacity mine cars.

Sinking of the new No. 5 shaft to a depth of 632 yd., and repairs to the No. 4 shaft were finished at Hucknall Colliery and work on the new pit bottom was started. Construction of pithead baths, coal-preparation plant, and other surface buildings at Cotgrave Colliery proceeded satisfactorily, but the shaft work suffered a serious setback due to an inrush of water.

The search for geological information continued, the total footage drilled being 20,241, compared with 25,734 in 1959. Boring operations were carried out altogether at 39 sites, 19 of which were below ground.

Accidents and Their Causes

Table 1 shows that the total number of persons killed and seriously injured (231) was six less than in the preceding year. The accident picture, states the Inspector, is clouded by the marked increase in the number of fatalities, 37 persons being killed, compared with 22 in 1959. The details of the picture, however, were very different and it is difficult to find any general explanation for the variation in accent in the several accident categories. Why,

TABLE 1.—*Total Persons Killed or Seriously Injured at Coal Mines Working under the Mines and Quarries Act, 1954, During the Year 1960 in the East Midland Division.*

	Killed.		Seriously injured.	
	1960.	Average, 1957–59.	1960.	Average, 1957–59.
UNDERGROUND				
Falls of Ground				
Face working:				
(*a*) Falls of roof	4	8.0	22	30.3
(*b*) Falls of face or side	1	2.7	29	32.0
Roadheads	5	6.4	12	16.3
Other causes	3	4.3	8	10.4
Total falls	13	21.4	71	89.0
Haulage and Transport	11	7.0	49	52.7
Miscellaneous causes	6	7.0	56	40.3
Total Underground	30	35.4	176	182.0
,, Surface	7	3.3	18	19.3
Underground and surface	37	38.7	194	201.3

for example, should there be such a welcome reduction in the number of accidents occurring from falls of ground, a relatively unchanged situation in haulage and transport, and a marked increase in the number included in the main miscellaneous category? It might well be that placing stress on one particular group of accidents detracts the attention of workmen and officials from other risks. None of the accidents brought to light any unknown hazard, but there is the usual sorry story of being wise after the event. All officials and workmen should examine their jobs afresh, in prevailing circumstances, and take immediate and adequate preventive action.

Thirteen persons were killed and 71 seriously injured in accidents from falls of ground, compared with 11 killed and 97 seriously injured in the preceding year. This marked reduction in total casualties is very welcome as it is the lowest figure for many years. Gratifying as it is, however, to report such improvement, the percentage of accidents avoidable either by strict compliance with the Support Rules or the exercise of ordinary caution is still far too high.

Falls of Roof on Side

Four persons were killed and 22 seriously injured by falls of roof at the working face, compared with six killed and 29 seriously injured in 1959. Of these, three fatal accidents and 10 accidents involving serious injuries occurred on power-loaded faces, and the remainder on orthodox machine cut hand-filled units. The outstanding feature of most of the accidents is that the falls occurred in areas where conditions were known to be poor or were suspect. Three persons were killed and 13 seriously injured in circumstances which suggest that weaknesses existed and additional support was necessary.

Accidents due to neglect in the setting of temporary supports to newly exposed roof occur each year with dismal regularity and in this respect 1960 was no exception. One person was killed and another seriously injured in separate incidents due to falls of roof, on the face side of panzer conveyors, which might have been averted had temporary supports been set promptly. In previous reports attention has been drawn to the risks produced by the removal of supports without taking into proper account the adequacy of those that remain. Three accidents occurred while props were being recovered from places where roof supports had been withdrawn and there were three other accidents to persons who had neglected to set temporary props before withdrawing supports.

One person was killed and 29 seriously injured due to falls of face or side, compared with one killed and 40 seriously injured in 1959. The reduction in the number of accidents from this cause, it is stated, is most encouraging, but 14 persons were injured while working on the face side of the conveyors on power-loaded faces. In reports for 1958 and 1959, disappointment was expressed at the lack of progress in designing satisfactory ploughing arrangements to eliminate the necessity for persons to work on the face side of conveyors. For 1960 it is gratifying to be able to report marked progress in this direction.

A plough devised at Langton Colliery and designed to trail behind a trepanner machine effectively cleans the track, can be modified to suit particular conditions, and is now in use at many collieries in the division. Promising experiments are also in progress at some collieries and at the Central Engineering Establishment of the National Coal Board on the design of ploughs or other mechanical means for removing coal from the new conveyor track.

The risks arising from coal falling from faces are influenced by the depth of pre-cutting, a practice common to most power-loader installations. Pre-cutting should be limited to the depth the machine will take, and at some collieries it has been found possible to reduce the depth of pre-cut even further and still obtain efficient operation of the machines. Similar reductions might be effected in many more instances and it is suggested that managers should re-examine their installations with this objective in view.

One person was killed and 15 seriously injured at faces which were cut by orthodox machines where hand filling was practised. Although this is a considerable reduction from the 30 incidents in 1959, it cannot in any regard be counted as satisfactory. The reports of investigating Inspectors indicate that almost all the accidents might have been prevented by attention either to effective spragging, the pulling down of overhanging coal or by working on the "buttock" instead of on the "fronts".

Five persons were killed and 12 seriously injured by falls at roadheads, compared with two killed and 16 seriously injured in 1959, and the failure to make any real progress in securing better support in the roadhead area is very disquieting, states the Inspector. Roadheads are notoriously dangerous places inasmuch as they usually require a considerable area of roof to be supported by girders, bars, and props, and it is imperative that the support given should not only be adequate, but be put into position as soon as possible after sufficient ground has been exposed.

Probably the most difficult area in which to apply early and adequate support is that between the last permanent girder and the newly exposed face of a ripping lip. In the last report reference was made to the use of containers which would accept the ends of steel arched girders thereby enabling them to be erected before the ripping debris had been removed. While several collieries have experimented with containers of one kind or another it is disappointing that more progress has not been made in their adoption. It seems very strange that the design of a receptacle found to be satisfactory in operation at one colliery is quite unacceptable at another.

In securing the roof between the ripping lip and the face careful measures are required to ensure the stability of the supports, most of which have to be moved to enable the advance of getting and conveying machinery. It is perhaps significant that

none of the accidents in these areas occurred where the system of support was by long girders set at right angles to the coal face.

One of the main objects of any planned system of roadhead support is to avoid falls which are not only in themselves a danger, but which may result in the formation of large cavities which, in turn, bring other well-known hazards. If such cavities do occur great care should be taken to prevent, if possible, their extension and to secure against the risk of further falls from within the cavity. In this connection it should be remembered that difficult and extensive cavities have been satisfactorily filled in the division by the use of vermiculite concrete.

Three persons were killed and six seriously injured by falls at the waste edge, compared with seven seriously injured in the preceding year. There is nothing new in the circumstances surrounding any of these accidents as they occurred either by persons going into unsupported areas in the search for packing material or by falls resulting from the instability of supports at the waste edge and by unsafe practices while drawing off. The Inspector makes no apology for reiterating the comment made in his last report when he said: "I cannot understand why a double chain system of drawing off is not established at every colliery in the division." Although the majority of these accidents occurred on faces where strip packing was practised, difficulties in support have arisen on caved faces. In this connection managers should proceed very warily when changing from strip packing to caving. It is advisable, in many circumstances, that packs should be dropped slowly and progressively rather than a sudden change from high percentage packing to none at all.

Haulage and Transport Accidents

While the dangers associated with mechanical haulages and conveyors may sometimes be obscure, the same cannot be said of those related to hand, horse, and gravity haulages. One would think that all the risks in this category were well known and avoidable with ordinary care. It is, however, clear from the reports of Inspectors that at least three of the four fatalities and several of the serious accidents resulted from taking unnecessary risks. In one instance two men loaded a small wooden tub with sleepers and five pairs of 12 ft. steel rails. They pushed it on to a badly canted length of track where it capsized and one of them was killed outright by the falling load. Not only was the condition of the track unsatisfactory but a vehicle specially designed for transporting materials was readily available.

In another case two men were tramming a tub of sand on an undulating roadway when it got out of control and struck and killed an official. Lockers were all that were needed to keep the tub under control, but they were not available. A 60-year-old pony driver was killed through failure to take the simple precaution of unhitching a pony from a derailed tub before attempting to re-rail it. The pony moved forward and he was crushed between the tub and the side of the roadway. The other fatality resulted from the failure to provide a safety contrivance as a result of which a runaway tub crashed through a ventilation door just as an overman was approaching it from the other side.

One person was killed and 14 seriously injured in accidents caused by machinery, compared with two killed and 13 seriously injured in 1959. Although machinery is used at many places throughout a mine, all the accidents occurred in connection with plant at or near working faces. Twelve of them were associated with power-loading machines, both in longwall and narrow workings, and three with standard longwall cutting machines. The fatality occurred on a trepanner loader face when the turret jib caught and dislodged a corrugated steel strap which struck a machine operator on the head. This regrettable incident is very similar to one which occurred in 1958 when the Inspector commented: "We have so frequently stressed the desirability of keeping supports as close to the machine as possible and the accident indicates the necessity for extreme care in this direction."

Machine operators are, normally, very skilled personnel, but it is clear from the circumstances surrounding the accidents that much more care is required particularly in speed control and the safe positioning of machines. This is particularly pertinent where machines are operating in restricted places. Five persons were seriously injured when crushed by machines which they were operating, power loaders being involved in four incidents. Three of the accidents occurred in narrow work and one on a longwall face because of the sudden movement of machines either as the result of travelling on uneven floors or making contact with roof supports. The other accident occurred when an operator inadvertently switched a machine into flitting speed and was crushed against another machine.

In his report for 1959 the Inspector referred to the tremendous amount of energy which can be stored in the haulage ropes of power loaders and warned against the dangers arising from their sudden movement or breakage. In 1960 two persons were seriously injured when struck by the projected ends of broken ropes. The other two accidents occurred to workmen who were struck by ropes which straightened suddenly after being pulled out of alignment.

Year after year with distressing frequency Inspectors have commented on accidents as a result of machine operators coming in contact with moving pick chains. This year there were six such accidents and there is still no satisfactory mechanical protection against this danger. Until there is, it is necessary to impress on all machine operators the necessity for the utmost care particularly in keeping clear of moving chains during "jibbing in" and "jibbing out" operations. The dangers associated with the threading of driving belts on machinery should be well known; but a mechanic of a mine lost his foot, when caught by the loading bar of a Meco-Moore machine running in reverse, while he was standing between the jibs of the loader thread-

ing a belt by coupling it to the old one. This accident as much as any other emphasises the truth of the expression "the safe way to do a job is the right one".

Seven persons were killed and 18 seriously injured in accidents from all causes on the surface, compared with one person killed and 22 seriously injured in 1959. Although there is little difference in the overall number of casualties, the startling increase in the number of persons killed is most distressing. There is little excuse for a large percentage of the accidents as they were avoidable with a little care and foresight.

The most outstanding increase occurred in the South Nottinghamshire and South Lincolnshire District, which in 1959 had shown a marked improvement; conversely, in the Leicestershire and South Derbyshire District there were only two casualties compared with 10 in 1959.

A particularly distressing fatality resulted from a momentary lapse on the part of a banksman, who, forgetting that he had given an instruction to a labourer to retrieve a tea can from an ascending cage when it was decked, operated the pneumatic rams which pushed a tub forward and crushed the man against the shaft superstructure.

Ignitions Below Ground

Three ignitions of firedamp were reported during the year; two of them in the undercut on the same face within an interval of four months. The first of these two incidents resulted from cutter picks contacting hard floor when a machine was tilted in an effort to release the jib which had become held in the cut. Following this incident a whale jib was fitted to the machine and with correct positioning of water sprays it was hoped to avoid any further incident. As indicated a second ignition did occur, again as the result of the revolving picks striking hard floor, but on this occasion the water spray had been turned off.

Fortunately, in both instances the flame was quickly extinguished and following the second incident overcutting was introduced. The two incidents, however, underline comments in previous reports that the only safeguard in such circumstances is to ensure that, wherever possible, cutting is done at such an horizon that contact with hard or pyritic material is avoided and that there is an adequate supply of water to the picks. In this connection wet cutting is now generally practised.

The third ignition occurred during shotfiring operations at a face ripping. On this occasion the firing of a fourth single shot was followed by burning gas over a length of about 8 yd. at the crown of the arched roadway supports. Ignition appears to have resulted from the presence of a break at the back of a shothole and might have been avoided if the shotfirer had inserted a plug of stemming at the back of the hole, as required by the Regulations. These occurrences which repeat in number and in type the experiences of the previous three years give cause for grave concern. It needs little imagination to visualise the serious consequences which might have resulted from any one of them.

Seven incidents of outbreaks of fire below ground were reported, compared with 12 in 1959. Two of these related to fires which occurred on gate belt installations some time after the end of the filling shifts. Both instances, which might have had much more serious consequences, emphasize the need not only for continuous cleaning and maintenance, but the importance of close examination during, and for a reasonable period after, the running of the conveyors.

There were three fires from the use of electricity, two of them arising from faults on cables. In one instance the cable had been damaged and in the other the cause was traced to a short circuit in the earth fault protection in the bus-bar chamber. In this incident pungent fumes from the burning cable affected 10 persons working on the return side, but all recovered after receiving medical treatment. The third, which was quickly dealt with, occurred as the result of a severe short circuit inside the isolator chamber of a gate-end switch.

In July there occurred at Cotgrave Colliery an inrush of water which, although it produced many anxious moments, might have had much more serious consequences. It was known that some parts of the concrete lining of the two shafts at this new colliery had deteriorated in strength, and a decision had been made to line them with cast-iron tubbing. The indications were that this was more urgently required in the No. 2 shaft, and work had been almost completed there and preparations were in progress to transfer the men to lining the No. 1 shaft when the inrush occurred. While men working from the sinking scaffold positioned a little over 500 ft. from the top of the No. 1 shaft were removing pipes, a sudden inrush of water occurred only 36 ft. below them. The normal make of water at the pit prior to this was about 150 gal./min. and the capacity of the two underground pumps, situated at the 1,750 ft. level, 700 gal./min. The estimated increase in flow from the inrush was about 600 gal./min. and the sump capacity of the two shafts would, in normal circumstances, have given sufficient time to increase the existing pump capacity and so deal with the total make. Unfortunately, however, one of these pumps broke down and could only be replaced by one of 150 gal./min. capacity. Although the inrush continued unabated it, fortunately, did not increase and, after filling the No. 1 shaft sump the water overflowed to the No. 2 sump where it continued to rise at the rate of about 10 ft./hr. At this stage the situation seemed to be out of control, but the position was retrieved by what can only be described as a remarkable piece of ingenuity.

There was available a 450-gal./min. submersible pump suitable for a maximum head of 650 ft. The scaffold was lowered below the point of inrush and a large tank hung through it to act as a sump for this pump. To ensure the flow of water into the tank the scaffold was covered with p.v.c. cloth, and tucked against the shaft sides. This arrangement was entirely successful and served to maintain the situation until large capacity pumps with the necessary columns could be installed below ground.

NCB Surplus for the First Half of 1961

IN its statistical statement for the first half of 1961 the National Coal Board discloses a surplus of £2,600,000, resulting from a surplus of £8,892,000 in the first quarter of the year and a loss of £6,292,000 in the second quarter.

Detailed results for the first half-year are given in the accompanying tables. Colliery profits amounted to £18,650,000 and ancillaries showed a profit of £1,280,000, while there was a profit of £3,465,000 on open-cast working, making a total for the first half-year of £23,395,000—£19,405,000 in the first quarter and £3,990,000 in the second quarter. Interest payable, less interest receivable and other income, amounted to £57,000.

Interest payable to the Minister of Power totalled £20,738,000.

The figures in the tables relate to deep mines worked by the National Coal Board and exclude open-cast workings and mines licensed in accordance with Section 36 of the Coal Industry Nationalization Act.

Licensed mines produced about 1.2 per cent. of the total quantity of deep-mined saleable coal produced in the first half-year. Receipts in respect of miners' coal supplied at concessionary rates amounted to £778,163.

TABLE 1.—*Costs of Production, Proceeds, and Profit of Collieries for the First Half-year of* 1961 *(Great Britain).*

	Tons.
OUTPUT OF COAL:	
Tonnage disposable commercially	87,103,388
Mine consumption	2,381,272
Miners' coal	2,474,418
Saleable tonnage from NCB mines	91,959,078

COSTS AND PROCEEDS:	Amount. £	Per ton saleable. s. d.
Wages (including holiday pay, sick pay, and allowances in kind)	222,523,951	48 4.8
Roof supports, general stores, and repairs	68,828,739	14 11.6
Coal and other power consumed	19,521,206	4 2.9
Other costs (including depreciation)	91,112,196	19 9.8
TOTAL COSTS	401,986,092	87 5.1
PROCEEDS	420,635,960	91 5.8
PROFIT (before charging interest)	18,649,868	4 0.7

AVERAGE EARNINGS (ALL AGES):	Cash earnings. s. d.	Value of allowances in kind. s. d.	Total. s. d.
Per manshift worked:			
At the face	81 4.5	4 7.6	86 0.1
All underground	69 10.5	4 2.9	74 1.4
Surface	48 5.1	3 7.9	52 1.0
All workers	65 2.4	4 1.4	69 3.8*
Per wage-earner per week:	s. d.	s. d.	s. d.
At the face	358 6	20 5	378 11
All underground	330 6	20 1	350 7
Surface	258 2	19 6	277 8
All workers	316 2	20 0	336 2*

* The estimated average earnings in the industry, including the value of allowances in kind, in Great Britain for all adult male workers, 21 years and over, in the first half-year of 1961, amounted to 71s. 7d. per manshift worked and 348s. 5d. per week.

TABLE 2.—*Costs of Production, Proceeds, and Profit or Loss of Collieries for the First Half-year of* 1961.

	Scottish Division.	Northern (N & C) Division.	Durham Division.	North-Eastern Division.	North-Western Division.	East Midlands Division.	West Midlands Division.	South-Western Division.	South-Eastern Division.
OUTPUT OF COAL:	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
Disposable commercially	8,331,318	5,821,163	10,965,317	18,504,409	5,710,128	21,503,080	6,715,128	8,838,428	714,417
Mine consumption	264,241	67,868	105,213	727,715	207,944	473,157	193,954	318,477	22,703
Miners' coal	251,175	193,511	460,016	565,571	127,077	408,914	160,173	289,050	18,931
Saleable from NCB mines	8,846,734	6,082,542	11,530,546	19,797,695	6,045,149	22,385,151	7,069,255	9,445,955	756,051
COSTS AND PROCEEDS:	Per ton saleable. s. d.	Per ton saleable. s. d.	Per ton saleable. s. d.	Per ton saleable. s. d.	Per ton saleable. s. d.	Per ton saleable. s. d.	Per ton saleable. s. d.	Per ton saleable. s. d.	Per ton saleable. s. d.
Wages (including holiday and sick pay and other allowances)	58 8.3	50 5.2	59 4.0	44 9.3	52 5.3	34 8.4	45 7.8	62 3.3	65 4.1
Roof supports, general stores, and repairs	17 0.5	14 11.0	13 11.6	14 6.5	17 1.7	13 5.0	15 1.3	17 2.3	17 1.1
Coal and power consumed	4 11.4	3 1.9	3 9.7	4 3.1	5 1.0	2 10.2	4 1.2	7 4.7	7 7.4
Other costs (including depreciation)	25 4.3	19 7.1	20 11.4	16 6.8	26 5.7	14 6.6	22 9.9	25 11.6	22 2.9
TOTAL COSTS	106 0.5	88 1.2	98 0.7	80 1.7	101 1.7	65 6.2	87 8.2	112 9.9	112 3.5
PROCEEDS	93 9.7	88 4.7	99 10.9	90 0.9	97 10.8	78 3.1	93 10.3	108 6.0	102 11.0
PROFIT OR LOSS (before charging interest)	Loss. 12 2.8	0 3.5	1 10.2	9 11.2	Loss. 3 2.9	12 8.9	5 2.1	Loss. 4 3.9	Loss. 9 4.5
(*a*) MANSHIFT AND (*b*) AVERAGE WEEKLY EARNINGS (including value of allowances in kind):	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
At the face (*a*)	81 5.2	90 6.1	82 4.7	89 9.0	86 1.5	98 1.2	88 1.8	72 4.7	98 5.6
" " (*b*)	367 10.0	409 2.0	384 8.0	364 2.0	378 4.0	427 2.0	379 11.0	334 2.0	417 2.0
All underground (*a*)	70 10.8	76 3.2	72 2.4	76 1.5	72 10.5	81 1.2	74 8.9	67 3.2	81 3.7
" " (*b*)	337 6.0	362 8.0	351 1.0	345 7.0	341 6.0	385 5.0	351 5.0	325 3.0	381 11.0
Surface (*a*)	48 5.5	52 9.7	54 2.2	51 7.0	51 11.5	53 6.9	52 1.5	51 6.0	53 1.8
" (*b*)	248 10.0	280 1.0	275 0.0	276 10.0	289 11.0	287 0.0	272 8.0	287 3.0	301 4.0
All workers (*a*)	66 7.1	70 10.5	68 10.9	70 7.0	68 4.3	74 10.5	68 10.2	63 7.5	74 11.4
" " (*b*)	321 6.0	345 3.0	337 7.0	332 0.0	331 10.0	365 2.0	332 6.0	317 4.0	366 2.0

FRENCH STEEL INDUSTRY IN MOSCOW

BY OUR SPECIAL CORRESPONDENT

ONE of the most striking features of the recent French exhibition in Moscow was the steel industry's pavilion, the structure of which attracted much attention in a country in which metal fabrication is not widely used for other than industrial buildings. The pavilion, 100 ft. long, 45 ft. wide, and 40 ft. high, was U-shaped, one of the branches being the floor and the other the roof. About 150 tons of 8/12 mm. steel plate were used in its construction. Though the top end of the roof was about 100 ft. from its supporting points, preliminary tests showed that the pavilion was able to withstand winds of over 75 m.p.h.

The exhibits were arranged attractively. The names of the 100 steel and tube companies were mentioned only in the general catalogue of the exhibition and in a special issue of Revue de Métallurgie, which was handed out to visiting officials and technicians. The exhibits consisted mainly of samples of steel products, diapositives, animated technical and statistical diagrams, and an electronic dictionary which answered 30 questions about the French steel industry. A room was set apart for the showing of films and for conference purposes.

It is estimated that about 1,000,000 visitors out of the total of 1,800,000 entering the exhibition went through the steel industry's pavilion. Visitors were generally very keen to get information on almost every aspect of the industry, including the techniques used in the various fields of production. Questions which could not be answered by the staff on the spot were recorded for written answer. Twenty-three conferences were organized for the benefit of Soviet technicians, covering the main or most interesting fields of steel and tube making in France. The invitations to the conferences were entirely in the hands of the Soviet authorities.

As was expected, no spectacular immediate results were registered in the field of trade relations, but representatives of the companies were satisfied that useful contacts were made or developed. No immediate yields could be hoped for, as the exports of French steel provided for by the Franco-Soviet trade agreement—225,000 tons in 1961—are already running normally. In 1960, exports reached 172,000 tons, made up mainly of bars, plate, hot- and cold-rolled sheet, magnetic sheet, stainless steel, and 14,000 tons of tubes. Exports of French steel products to the USSR have shown continuous improvement in recent years, flat products taking up an increasing share of the total, the percentage moving up from 30 in 1954 to 79.3 in 1960.

The USSR ranks currently seventh among buyers of French steel, after Germany, Italy, the USA, Belgium, Switzerland, and the Netherlands. The value of steel and tubes exported last year to the USSR amounted to 203,000,000 of new francs—over 35 per cent. of the value of total French exports on the Russian market.

French steelmakers considered their contribution to the success of the Government-sponsored national exhibition in Moscow as an investment for the future. In the meantime, the French steel industry has left behind a reminder of its existence, as, by agreement between Soviet and French authorities, the steel structure of the pavilion is to remain at Sokolniki Park.

New Low-cost Stainless Steel for Cold Working

NEWLY developed stainless steel which combines low workability and low cost has been announced by the Armco Steel Corporation, according to Iron Age (August 31, 1961). Known as Armco 18-9 LW, the steel offers fabricating and corrosion-resisting properties similar to those of Armco 16-18 stainless and other high-nickel alloys, although the price is said to be that of AISI Type 305 stainless.

The new material is expected to be used for motor-car and aircraft parts, chemical equipment, and other applications calling for corrosion resistance.

Reason for this development is that availability of high-nickel stainless and AISI Type 305 besides several minor grades has resulted in too much diversification. A general-purpose grade capable of meeting both fabricating and price considerations, according to Armco, is expected to "eliminate double inventories and to simplify ordering." Percentage composition of the new steel is:—C, 0.10 max.; Mn, 2.00 max.; Si, 1.0 max.; Cr, 17.00 to 19.00; Ni, 8.00 to 10.00; Cu, 3.00 to 4.00.

It has a low work-hardening rate, but possesses the tensile strength of stainless steel—as annealed and after varying degrees of cold reduction. Machining properties are claimed to be satisfactory.

Canada's Natural Gas Industry

Authorization in 1960 of large-scale exports to the United States brought a renewal of activity in the Canadian natural-gas industry. Permission was granted to five pipeline companies to export a maximum of 1,071,000,000 cu. ft. a day. This resulted in the initiation of new gas-pipeline construction programmes and an increase in the development of field facilities. The largest construction project begun was that of the Alberta-California pipeline, scheduled for completion in 1962. This line will carry more than 400,000,000 cu. ft. a day. In 1960 the net output of natural gas, exclusive of flared gas and waste, was nearly 25 per cent. greater than in 1959. Gross production was 584,470,000,000 cu. ft., compared with 477,900,000,000 cu. ft.

Value of NIFES

EVIDENCE OF INDUSTRY'S GROWING CONFIDENCE

FACTOR that has had a considerable effect on the past year's work of the National Industrial Fuel Efficiency Service (NIFES) was referred to by Sir Leslie Hollinghurst, the chairman, at the seventh annual meeting held in London on Wednesday. The decision of the National Coal Board to enlarge its technical service to consumers resulted in an abnormal loss of engineers to NIFES—the technical staff being reduced from 219 to 192. Rather than make good the less by widespread recruitment NIFES has consolidated, concentrating staff in areas of greatest demand.

With a 10 per cent. reduction in engineering staff and with the problem of securing work at increased charges, Sir Leslie found it gratifying that results for 1960-61 had more than matched those of the previous year. Industrial income showed an increase of nearly 20 per cent. and earnings were up to £210,910 (£182,391). Bookings during 1960-61 also showed a 20 per cent. increase.

The chairman compared conditions when an acute fuel shortage prevailed when, however, it was hard to convince industrialists that worthwhile savings could be made, with six years later when the fuel shortage had changed to abundance, but industry had become more, not less, appreciative of the advantages to be gained from NIFES advice.

Recovering Costs

At one time the most optimistic view was that it might ultimately be possible to recoup half the cost of fee-earning work undertaken specifically for individual companies. Yet the board had recovered an increasing proportion of these costs—32 per cent. of £58,000 costs in the year ended March 31, 1955, to 70 per cent. of £302,000 for the past year. The fees were increased on January 1, 1961, and there was no doubt that NIFES, having achieved a recognized position in industry, would find its clients accepting the need to pay a fair price for its services.

As a consequence of the policy of becoming, ultimately, self-supporting, there had been a further reduction in the drawings from the nationalized fuel industries. It had been unnecessary to call upon them for more than 75 per cent. of their guaranteed contributions of £450,000, as compared with 82 per cent. in the previous year. Subscriptions from the major oil companies had also been reduced.

The work of NIFES was being extended oversea—to Eire, Canada, and India, and negotiations were taking place with Israel and the Argentine.

Summing up, Sir Leslie said that it was clear that British industry was facing increased competition abroad, while at home costs continued to rise and profit margins to fall. This situation compelled industrialists to apply their attention more than ever to reducing their manufacturing costs. NIFES work had proved how often fuel costs could be cut by substantial amounts and, even more important, the search for ways of reducing fuel costs resulted in the discovery of ways of improving production efficiency.

BECAUSE OF A slight increase in orders, the Consett Iron Company, Limited, manufacturers of pig-iron, steel, and coke, of Consett (Co. Durham), is restarting about 50 of the 450 men paid off a few weeks ago.

Deputies Seek a Shorter Shift

LEICESTERSHIRE resolution instructing the national committee to seek a reduction of an hour a day (8½ hours to 7½ hours) in deputies' working time was adopted at the annual conference of the National Association of Overmen, Deputies, and Shotfirers at Scarborough last week. A resolution which sought to claim an extra week of annual holiday was not adopted.

Replying to the resolution on extra holidays, the general secretary, Mr. J. Crawford, said the national committee was opposed to it because of the economic position of the coal industry and the fact that it was facing severe competition from oil.

In his annual report, Mr. Crawford criticized any increase in the price of coal to pay for further labour improvements. It was out of the question, he said, for such action would price coal out of further markets and jeopardize existing ones.

NACODS did not dispute that the answer was in increased efficiency through mechanization, said Mr. Crawford, but it did claim that to achieve the desired efficiency, particularly in intensified face mechanization, it was imperative in the interests of safety and close face supervision that a four-shift cycle of deputies should be introduced. He reminded the conference that no other class of workers in the industry had a stipulated shift of 8½ hours underground.

Local Authorities Lag Behind in Smoke Control

DISTURBING feature of the operation of the Clean Air Act was that of the 294 English authorities whose areas were included in the provisional list of black areas, 73 had not submitted programmes for making smoke control orders, said Mr. John C. George, Parliamentary Secretary to the Ministry of Power, on Wednesday.

He was speaking at the annual conference and exhibition at Brighton of the National Society for Clean Air. Local authorities, he said, had been slow to introduce smoke control schemes under the Act which was passed five years ago.

In his presidential address, Lord Cohen of Birkenhead said that the Act could lessen illness, misery, and death, medical costs, absenteeism, expenditure on artificial illumination, repair of buildings, damage to crops and animals, and improve fuel resources.

Appointments

Mr. G. PATERSON has been appointed personnel manager of Head, Wrightson & Company, Limited.

Mr. R. L. HIGGIN has been appointed general manager, components group, of the Plessey Company, Limited.

Mr. J. LAND has been appointed divisional chief estimator of the switchgear division of Associated Electrical Industries, Limited.

Group personnel officer, Mr. WILLIAM F. MCMULLEN, has been appointed at the head office of the Birmingham Small Arms Company, Limited.

The British Hoist & Crane Company, Limited, has appointed Mr. D. L. O. LLOYD as crane sales manager. He joined the company after seven and a half years with Priestman Bros., Limited, as technical sales director.

Shipbuilding manager for the past two years at Austin & Pickersgill, Limited, Sunderland, Mr. JAMES GILFILLAN has been appointed to the new position of general manager of the Southwick shipyard and Wear dockyard.

At one time with BTR Industries, Limited, Mr. DAVID C. H. B. LEWIS, who has extensive industrial rubber experience, has been appointed technical sales representative for South Wales and the West of England for the industrial products division of North British Rubber Company, Limited.

MR. D. C. H. B. LEWIS

Well known in golfing circles, he was Boy Champion of Wales in 1934, won the Welsh Amateur Championship in 1937, and was capped for Wales 14 times.

Miss B. P. PARK, formerly with Optoshield, Limited, has been appointed sales manager of the eye protection department of Pyrene-Panorama, Limited, Brentford (Middx).

Mr. K. G. SMITH has been appointed deputy secretary of the General Electric Company, Limited. He continues as GEC pension fund secretary and investment manager. Mr. N. Poyner becomes chief cost accountant.

Mr. MICHAEL G. J. FRY, formerly chief engineer with the Grantham (Lincs) engineering firm of British Manufacture & Research Company, Limited, has been appointed technical director of Brentford Transformers, Limited, Crawley (Sussex).

Dr. J. W. MENTER, who has been appointed director of the Tube Investments, Limited, research laboratory at Hinxton Hall, near Cambridge, has for the past seven years been leading research teams at Hinxton in the study of the microstructure of metals and has promoted notable advances in the techniques of electron microscopy and X-ray microanalysis.

Appointed technical sales representative for the Midland counties, for Richard Sutcliffe, Limited, Horbury (Yorks), manufacturers of mining machinery and mechanical handling equipment, Mr. WILLIAM LEEMAN will serve surface industries (including NCB surface work) in Lincolnshire, Derbyshire, Nottinghamshire, Leicestershire, Northamptonshire, and Cambridgeshire. Educated at Chesterfield Grammar School he was subsequently with Plowright Bros., Limited, and more recently with the Sheepbridge Engineering Company, Limited.

Mr. R. MORTIMER, assistant manager, sections mills, Appleby-Frodingham Steel Company, branch of the United Steel Companies, Limited, has been appointed assistant manager of the rod and bar mill. He will be specifically responsible for the operation of the breakdown and billet mills. The appointment is an interim one until production in the rod and bar mill is established.

Changes in the framework of its industrial products sales division are announced by the Goodyear Tyre & Rubber Company (Great Britain), Limited. Two marketing supervisors, Mr. W. R. QUICK (hose products) and Mr. H. F. ESCOTT (belting products), have been appointed, while two adidtional sales engineers, Mr. C. BROWN and Mr. P. BEDFORD, have joined the division's southern and northern offices.

Scotland's Steel Exporters Criticized

SCOTLAND'S record as an exporter of steel and ships to Sweden was strongly criticized last week by Mr. A. E. Wernly, secretary of the British-Swedish Chamber of Commerce in Stockholm, following a fortnight's tour of Scottish industrial centres. Referring to the steel forgings industry, he said: "Until they free themselves from their restrive practices, they will never be competitive. The firms have agreed on a minimum price for exports and it is too high." He said he knew one Scots firm which had gone to great lengths to try to export, but could not because of this.

Saying that two or three Scots shipbuilders had told him they would consider visiting Sweden to seek orders, he said it was not before time. "I have never known a Scottish shipbuilder come out before to look for business," he said. "Perhaps they think the Swedish shipyards are all too efficient, but they are wrong. I am sure there are some orders to be won."

This is the second instance in the past fortnight of criticism of Britain's export performance in Sweden. Recently Mr. Arne Lundberg, president of the Swedish Chamber of Commerce, said in Edinburgh that British exporters had a "take it or leave it" attitude to selling in Sweden.

Expansion of Exports by A. H. Hunt (Capacitors)

WITH expanding exports and the introduction of new ranges of capacitors, the directors of A. H. Hunt (Capacitors), Limited, feel that the company is geared to tackle any challenge of the future, states Mr. Sydney H. Brewell, chairman. Extra production space at Wrexham and New Addington is now available, together with new or modernized plant, either ready or near completion. In the year ended December 31, 1960, the company made a net profit of £190,275 after tax of £173,692, and a final dividend of 15 per cent. is declared, making a total of 20 per cent. for the year.

The company is this year celebrating its 25th anniversary. The original company of A. H. Hunt, Limited, was founded by Mr. A. H. Hunt and first registered in 1901, trading in various electrical goods as agents, and also manufacturing certain lines of its own. The present company was formed in 1936 to specialize in capacitors.

IRON AND STEEL TRADE

DIRECT exports of steel products, as reflected in the trade figures from North-east ports, have fallen parallel to the decline in the home market, and are particularly evident in heavy products such as sections, joists, rails, and plate. This places a double handicap on the increased capacity of the industry which is now no more than 70 per cent. employed. However, the present dullness in the market is not preventing the industry from carrying on with its expansion plans and, although a revival in trade is not now expected before the spring, manufacturers are fairly confident in the future.

Pig-iron

Not for very many months has the supply position so far as pig-iron is concerned been so easy and all grades are plentiful. The demand is the heavier for the low phosphorus irons, reflecting the steady business being done by the engineering and speciality foundries. These plants are also taking up fairly good quantities of hematite and some refined irons.

The steelworks are well provided with basic pig-iron for both stock and consumption and although furnace production is well below capacity levels, outputs are more than sufficient to satisfy current demand. Fairly substantial consignments of basic steelmaking pig-iron are being exported.

Ferro-alloys

There has been a reduction of 4d. per lb. in the price of ferro-tungsten so that today's price is 9s. 11d. per lb. W contained. Tungsten metal powder is similarly reduced to 12s. 11d. per lb. The demand for ferro-tungsten is still quiet, but the reduction may encourage consumers to buy again. The low and high carbon grades of ferro-chrome are of reasonable interest and ferro-manganese is fairly active.

While still being an active feature ferro-silicon demand is not attaining the high levels of earlier in the year, and silicon metal fails to attract much attention.

Semi-finished Steel

Most of the re-rollers are striving to improve outputs and are going out for all the business obtainable, but orders continue scarce for small bars, light sections, strip, etc. Fortunately the demand for reinforcing rods and bars still holds up fairly well.

Reasonable quantities of steel semis are held and orders are being placed only for current needs. Demands from some re-rollers for prime material are very scarce and home steelworks could step up deliveries easily. Alloy steel billets are now available although delivery dates are still extended.

Finished Steel

Demand is still well below normal with many consumers holding substantial stocks which they are reducing gradually. Only those items which they cannot get from stock are being ordered. The position in the motor industry in the past few weeks seems to have worsened slightly and re-rollers, and strip and sheet makers are having a difficult time in finding enough business to keep plant and men occupied.

Requirements of special alloy and high carbon steels for the engineering trades is about enough to maintain production, but the same cannot be said for bright drawn bars. Competition is still very keen for any constructional work going and structural engineers are having to give keen prices and delivery dates in order to capture further business.

Iron-ore Imports

IMPORTS of iron ore and concentrates (except chrome iron ore) and roasted iron pyrites in August, and the totals for the first eight months of this year and last, are shown in the table below.

From	Month ended Aug. 31.	Eight months ended August 31.	
	1961.	1960.	1961.
	Tons.	Tons.	Tons.
Sierra Leone	42,980	530,485	387,198
Canada	443,079	2,012,643	1,569,778
Other Commonwealth countries and Eire	—	22,727	7,134
Sweden	379,305	3,106,074	3,363,037
Norway	28,405	239,320	227,236
France	37,918	397,409	324,004
Portugal	8,800	242,942	117,598
Spain	42,222	520,713	489,382
Algeria	114,650	1,396,180	1,040,444
Tunisia	40,830	519,318	329,782
Morocco (including Tangier) ..	41,200	583,857	376,390
Liberia	34,920	348,942	328,263
Venezuela	116,439	1,094,372	1,300,036
Brazil	15,740	424,129	439,578
Other foreign countries	60,112	473,134	413,675
TOTAL	1,406,600	11,912,245	10,713,535

Scottish Ironfounding Firm Taken Over

SCOTTISH firm, Shanks Iron Founders, Limited, Arbroath, Angus, has been taken over by the National Steel Foundry (1914), Limited, Leven, Fife. The only firm in Scotland producing blackheart malleable iron castings, Shanks Iron Founders is an associate company of Alexander Shanks & Sons, Limited. The latter company will continue under the present ownership, concentrating on general and agricultural engineering.

National Steel Foundry is a subsidiary of Lake & Elliot, Limited, Braintree, Essex. The Fife firm intends continuing in Arbroath the production of blackheart malleable and grey iron castings and chilled iron pulleys. Mr. J. S. McMillan, of National Steel Foundry, who is president of the Scottish branch of the Institute of British Foundrymen, has taken over as general manager.

SEVERAL HUNDRED steelworkers employed at the No. 1 tube mills, Clydesdale Steel Works, Bellshill (Lanarkshire) of Stewarts and Lloyds, Limited, began a four-day working week on Monday.

Coalfield News

Severe Test for Coal Bands in London Final

ONE of the toughest tests in their competitive history faces seven colliery-associated bands when they compete in the National Brass Band Championship, in London, on October 28. The seven (out of 27) are Cory Workmen's, Cowpen & Crofton Workmen's, Crookhall Colliery, Easington Colliery, Kinneil Colliery, Mid-Rhondda Workmen's and Park & Dare Workmen's bands, and they face the Berlioz overture "Les Francs Juges," one of the most difficult works, technically, set this century. Cowpen & Crofton, Kinneil and Mid-Rhondda appear in the top national contest for the first time.

Also taking part are:—Boldon Colliery, Cwmaman Institute, Dinnington Main Colliery, Ellington Colliery, Langwith Miners' Welfare, and Whitburn Miners' Welfare bands (second section final at Kensington Town Hall); Askern Main Colliery, Brancepeth Colliery, Pegswood Colliery, Upton Colliery, and Whitwell Colliery bands (third section final at Fulham Town Hall); Celynen Collieries, Hetton Silver, Nostell Colliery, and Pleasley Colliery bands (fourth section final at Hammersmith Town Hall).

Mr. JOHN STEWART, Lochgelly (Fife), who has just celebrated his golden wedding, is 75 and retired two years ago as a miner from Minto Colliery.

PRESENTATION OF 50-year long-service certificates to eight former miners of Deep Pit, Hanley (Staffs), were made by the colliery manager, Mr. W. G. Irwin.

CHAIRMAN of Rotherham Rural Council, Cllr. A. Steer, has closed his appeal on behalf of the Cortonwood Colliery disaster fund. It has reached 100 guineas.

A PRESENTATION from Cumberland miners was made to Mr. J. Hewitt, who was elected president of the Cumberland Area of the NUM in 1953 and who has retired from the mining industry.

OMS AT THE FACE in the Northern (N&C) Division of the NCB moved up to an average of 84.9 cwt. in the 38th week of the year, compared with 81.8 cwt. last year. Overall OMS was 28.7 (27.4) cwt.

MINERS AT THE 90-year-old Donisthorpe Colliery, near Ashby-de-la-Zouche, have set up what is thought to be a new national coal production record by winning 4,803 tons of coal in a week—an average of 27.9 tons per manshift.

OVERALL PRODUCTIVITY in the Durham Division of the NCB during the first 38 weeks of the year averaged 22.98 cwt. per manshift, against 22.02 cwt. per manshift in the corresponding period of 1960. At the face, productivity reached 65.69 (64.40) cwt.

COAL BOARD officials have told Caerphilly (Glam) urban council that little can be done about television interference in part of the town, caused by overhead coal buckets at Windsor Colliery, until more information can be obtained. The NCB has been investigating the matter and has discussed it with GPO officials.

OFFICIALS of the North-Eastern Division of the NCB and the National Union of Mineworkers discussed at a meeting on Saturday the results of investigations into the emission of gas at Cortonwood Colliery, Wombwell (Yorkshire), where four miners died in June. It was agreed that technical proposals for precautionary measures should be placed before the miners with a view to restarting the Silkstone Seam, where escaping gas caused the deaths.

Miners' Chief Calls for National Fuel Policy

FAILURE of the Government to adopt a national fuel policy had led to a tragic loss of confidence in the coal mining industry, Mr. S. W. G. Ford, president of the National Mineworkers Union, said at the Labour Party Conference at Blackpool on Monday. Moving a resolution calling for a national policy which would co-ordinate all fuel production, including oil, he said the need for proper and effective co-ordination was recognized by the Government in 1945 when, under the Fuel and Power Act, the Minister was charged with the responsibility for securing the effective, co-ordinated development of coal, petroleum, and other mineral sources.

The complaint now was that in spite of the machinery that this legislation placed at the disposal of the Minister, there had been complete failure on the part of the Conservative Government to bring about the necessary co-ordination. In 1945 about 92 per cent. of the country's fuel consumption was met by coal; today coal was meeting slightly more than 70 per cent. of Britain's fuel requirements.

Mr. Ford said that today manpower was standing at approximately 563,000—the smallest in the British coal mining industry for 70 years. Something had to be done quickly to restore confidence in the industry and check the now frightening drift of manpower.

Mr. Ray Gunter, for the executive, said there was little difference between the NUM and the executive on the issue. There was no field of the national economy where planning was more required than in fuel and power, and it was the height of stupidity to allow the coal industry to drift and the morale of the men to go down.

He asked that the motion be remitted to the executive, and conference agreed.

ECSC DELEGATION STUDIES BRITISH COLLIERY MANAGEMENT TRAINING

DELEGATION from the European Coal and Steel Community, led by M. G. Michel, director of the industrial problems and reconstruction department of the High Authority, has this week been visiting Britain to study colliery management training in the coal industry. On Monday the delegation met senior headquarters officials of the National Coal Board responsible for colliery management training. This was followed by a two-day visit to the East Midlands Division of the NCB, where the delegation saw training centre courses at work and had discussions with the divisional training officials.

The delegation also visited a method study course for colliery managers and union officials at St. Leonard's-on-Sea (Sussex). Today (Friday) the delegation will visit the board's staff college, at Chalfont St. Giles. They are to return to London after lunch and end their visit with talks with senior board officials at Hobart House.

A CARVED 5-ft. high wooden statue of St. Michael, patron saint of miners, was dedicated at Staveley Parish Church (Derbyshire), last Friday. The gilded figure, which stands on a lump of coal and incorporates a miner's lamp, will be placed in the miners' shrine at the church as a tribute to the men who work in Staveley's main industry.

THE COAL TRADE

A CERTAIN amount of bustle is evident in the house coal trade as consumers wake up to the fact that prices go up at the end of the month. Merchants, anxious to supply the descriptions ordered, are somewhat frustrated by shortages of popular qualities, but, apart from the constant headache of obtaining sufficient supplies of suitable authracites, they are coping so far with the expanding demand. The decision to work at selected pits on a number of Saturdays during the winter is welcomed in all quarters, as severe shortages of certain descriptions could well prove extremely damaging to the present improved " public image " of coal.

DERBYSHIRE

Pressure for all types of house coal is strong, and all available tonnages are being accepted by most merchants. Best grades are keenly sought, and very difficult to obtain in sufficient quantity, even to the extent of obtaining full deliveries against contract. The better types of screened cobbles and brights are moving well, and small additional tonnages are occasionally made available, while greater tonnages of cheaper brights than are available could be handled by many merchants. Best large nuts are coming to hand fairly well in face of a brisk demand, while washed medium nuts and washed doubles are popular, with few additional tonnages available.

Demand for domestic coke nuts is fairly steady after the price increase. No. 2 gas coke in this area is now to be known as Gloco, and No. 3 gas coke as Gloco nuts, there being a slight increase in price over normal winter price variations to coincide with this. Premium smokeless fuels are increasingly popular, and Rexco and Coalite are difficult to obtain. Cleanglow and Warmco are more readily obtainable. Anthracite supplies are proving a headache to most merchants, supplies of all grades being very tight and delays in despatch considerable. Phurnacite is also subject to appreciable delay, and pressure from consumers is firm. The small anthracite situation is proving a worry to merchants, who are doing all they can to try to maintain regular deliveries to users in face of heavy delays with supplies.

Industrial demand is fairly normal, and a satisfactory flow of supplies is reported. Nutty slacks remain in adequate supply. Dry screened nuts are subject to fair pressure, all available output finding a ready market. Hard steam coals are actively sought, and in general the flow of coals is satisfactory. Washed fuels are tightening gradually, although so far supplies enable distributors to handle current inquiries promptly.

JAPANESE IN MARKET FOR WELSH COKE

SHIPMENTS of coal and coke from the South Wales ports last week totalled 67,677 tons, and although this was 8,981 tons below the level of the previous week, it was 13,112 tons higher than in the corresponding period a year ago. The trade has shown a steady improvement during September and a weekly average of 71,500 tons during the month was the best for the year. Some large shipments of coke to Japan have been largely responsible for the improvement.

Figures for the various ports for the week ended October 1, 1961, with those for the corresponding period last year in parentheses, were: Newport, 11,455 (5,579) tons; Cardiff, 3,634 (8,853) tons; Penarth, 1,368 (1,948) tons; Barry, 15,616 (20,267) tons; Port Talbot, 1,349 (nil) tons; Swansea, 34,255 (17,918) tons.

Consumers' Coal Stocks Are Steadily Rising

CONSUMERS' stocks of coal continue to climb and, at 16,670,000 tons, are almost 3,000,000 tons better than at this time last year. Pithead stocks are fairly static at 22,362,000 tons, more than 12,000,000 tons below the 1960 comparable total. Output last week again rose and is now running at about 70,000 tons more than last year. However, at the rate for the first 39 weeks of the year, total production for the year would not top the 190,000,000-ton mark.

There were 563,460 wage-earners on colliery books on September 23, against 589,200 on September 24, 1960, the numbers engaged at the coal face being 211,080 and 223,510 respectively. Total absenteeism (all workers) in the week ended September 23 was 15.35 per cent., compared with 14.78 per cent. in the week ended September 24, 1960. Output at the face was 4.193 tons and overall 1.461 tons in the week ended September 23, compared with 3.971 and 1.402 tons in the week ended September 24, 1960.

The following table gives (in tons) the provisional figures of output of saleable mined coal by division in the week ended September 30, and the tonnage lost through disputes:—

Division.	Week ended September 30, 1961.		Week ended October 1, 1960.
	Total output.	Tonnage lost.	Total output.
Scottish	338,000	24,000	333,000
Northern (N&C) ..	237,000	—	244,000
Durham	452,000	—	467,000
North-Eastern ..	819,000	14,000	803,000
North-Western ..	239,000	2,000	261,000
East Midlands ..	910,000	—	871,000
West Midlands ..	285,000	—	264,000
South-Western ..	362,000	3,000	376,000
South-Eastern ..	28,000	—	29,000
Great Britain—			
Deep-mined coal ..	3,670,000	43,000	3,648,000
Open-cast coal ..	179,000	—	133,000
Other deep-mined (including licensed mines) ..	43,000	—	43,000
TOTAL ..	3,892,000	43,000	3,824,000

MR. LEONARD ROTHERHAM, member for research of the Central Electricity Generating Board, has accepted the invitation of the British Coal Utilisation Research Association to deliver the 10th Coal Science Lecture. The meeting is to take place at 5.30 on Wednesday at the Conway Hall, Red Lion Square, Holborn, London, W.C.1. Mr. Rotherham's subject will be " The Position of Coal in Electric Power Generation."

Board Changes

New Chairman for Dorman-Long

DEPUTY chairman of DORMAN LONG & COMPANY, LIMITED, Mr. Edward Thomas Judge has been appointed chairman in succession to the late Sir Ellis Hunter. Mr. Judge also becomes chairman of the subsidiary, Dorman Long (Steel), Limited, and will continue as managing director of this company.

MR. E. T. JUDGE

Mr. Judge who is 52, has been with the group for 31 years. He became deputy chairman of Dorman Long and managing director of its steelmaking subsidiary last March. He joined the company as a trainee in 1930 after leaving Cambridge University where he gained a mechanical sciences tripos with honours. Seven years later he became chief technical engineer and in 1944 was made a special director, being appointed a full member of the board in 1947. He took a major part in the company's large post-war developments, and especially in the design and construction of the new steelworks and the universal beam mill at Lackenby.

ALKALINE BATTERIES, LIMITED—Mr. J. W. Warner has been elected a director.

GEO. SALTER & COMPANY, LIMITED—Mr. G. P. Bache has been elected to the board.

VILLIERS ENGINEERING COMPANY, LIMITED—Mr. Ian Donaldson has been appointed to the board as financial controller.

WILKINSON TOOLS, LIMITED—Mr. F. Menelaus has been appointed to the board from which Mr. D. L. Atkins has resigned.

BRITISH TAR PRODUCTS, LIMITED—Mr. A. E. Brown, managing director, has retired from the board to which Mr. J. M. Lloyd has been appointed.

JOSEPH SANKEY & SONS, LIMITED, Mr. H. F. Hodgson, chairman and managing director, has retired from the position, although he will remain on the board.

ALLEN & SIMMONDS (AUTO-CULTO), LIMITED—Mr. G. H. Steele has been appointed managing director of the newly-formed subsidiary, Auto-Culto (International), Limited.

R. & J. DICK, LIMITED—Mr. W. J. A. Whyte has retired as foreign sales manager but remains on the board and Mr. A. C. Aitken has been appointed sales director in charge of home and foreign sales.

PATENT SHAFT STEEL WORKS, LIMITED—Mr. B. S. Pritchard, who retired on Saturday and relinquished his seat on the board on the same date, joined the company in 1927, and was appointed a director in 1944.

TIMKEN ROLLER BEARING COMPANY, LIMITED—Mr. R. L. Frederick and Mr. E. R. Knapp have been appointed to the board and Mr. Knapp as assistant managing director of the company's British Timken division. Mr. H. E. Markley has resigned from the board.

FIRTH CLEVELAND TOOLS, LIMITED—Mr. William H. Rigg has been appointed managing director of the company, a member of the Firth Cleveland, Limited, group. He will operate from the company's Tipton works in Staffordshire.

STELCON (INDUSTRIAL FLOORS), LIMITED—Mr. W. M. G. Brown has been elected joint managing director in place of Maj.-Gen. G. N. Tuck who has retired but remains on the board with responsibility as engineering adviser.

BRITISH INSULATED CALLENDER'S CABLES, LIMITED—Sir John Dean is retiring from the board of the company and certain subsidiaries to devote his time to the chairmanship of Submarine Cables, Limited, in which BICC and Associated Electrical Industries, Limited, have equal interest.

IMPERIAL CHEMICAL INDUSTRIES, LIMITED—Dr. A. Caress is to become research and development director from December 1. The appointment is in addition to his present one as an oversea director. He succeeds Dr. J. Ferguson, who is retiring from the board on November 30 after 30 years' service with the company.

UNITED GAS INDUSTRIES, LIMITED—Sir Leonard Owen, in anticipation of his ceasing to be a full-time member of the UK Atomic Energy Authority, has accepted an invitation to join the board. He will take over the chairmanship of two of the subsidiaries—Dowson & Mason, Limited, and Vacuum Metallurgical Developments, Limited.

Lancashire Steel's New Chairman

CHAIRMAN of the Lancashire Steel Corporation, Limited, for the past 30 years, Sir John James has retired from the position, and also from the chairmanship of the principal subsidiary companies. Mr. Philip Holloway, a director since 1951, has been appointed chairman of the Corporation and of its principal subsidiary companies, Lancashire Steel Manufacturing Company, Limited, Rylands Bros., Limited, Whitecross Company, Limited, and the Pearson & Knowles Engineering Company, Limited. On taking up these appointments he has resigned from the position of managing director of Lancashire Steel Manufacturing Company, Limited, and Mr. G. Barrington Thomas has been appointed managing director. Mr. Thomas has also been appointed to the board of the Lancashire Steel Corporation.

The Corporation also announces that Mr. G. K. Rylands, the joint managing director of Rylands Bros., Limited, and Whitecross Company, Limited, has retired and Mr. R. S. Bleckly, the other joint managing director, has been appointed managing director of both companies.

Thos. Firth's New Apprentice School Opened

NEW apprentice training school of Thos. Firth & John Brown, Limited, Sheffield, was formally opened last week by Mr. W. J. Carron, president of the Amalgamated Engineering Union. The school provides comprehensive training for 54 machine-tool workers, mechanical fitters, and electricians, and is staffed by five fully-skilled tutors.

Built on the site of a former strip mill, the school is an extension of the apprentice training scheme which the firm started in 1947. It has a self-contained lecture theatre, fully equipped with modern aids to training. Apprentices will spend up to two years at the school.

COMPANY NEWS

F. E. CALLOW (ENGINEERS), LIMITED, provender milling machine makers, etc., of Liverpool—The company has agreed to acquire the capital of Easton Callow, Limited, by exchange of shares.

MIDLAND BRIGHT DRAWN STEEL & ENGINEERING COMPANY, LIMITED—The purchase price for the recent acquisition of W. D. Bates & Son, Limited, iron and steel stockholders, of London, W.3, was £44,000.

WILLIAM SUGG & COMPANY, LIMITED, engineers, of London, S.W.1—Profits expanded to £171,720 (£129,173) and the dividend is raised by 5 per cent. to 27½ per cent., with a final of 17½ per cent. A one-for-three scrip issue is proposed.

DARLINGTON WIRE MILLS, LIMITED—Interim dividend is declared at 1½d. per 5s. share (same). The chairman states that the parent company's results have been affected by difficult conditions prevailing in the wire-drawing industry but subsidiaries continue to show progress.

DELTA METAL COMPANY, LIMITED—The offer to acquire the preference shares in Davis & Timmins, Limited, manufacturers of automatic screw machine products, of London, E.17, has been accepted by over 90 per cent. of the holders and has therefore been declared unconditional.

JOSIAH PARKES & SONS, LIMITED, makers of locks and brassfounders, of Willenhall (Staffs)—Group turnover and profit for the first half of 1961 both show an increase over the corresponding period of 1960, and indications are that this will continue during the second half of the year, it is stated.

W. A. TYZACK & COMPANY, LIMITED, makers of high speed steels, engineering tools, etc., of Sheffield—A dividend of 10 per cent. is being paid for the year ended July 31, as forecast when the company was made public last October. The profit increased from £102,943 to £129,248, subject to tax of £67,028 (£51,583).

ADAMANT & WESTERN ENGINEERING, LIMITED, engineers, of Luton (Beds)—Group profit for the year ended June 30, 1961, of £555,497 compares with £384,453. After tax of £260,310 (£200,883) and other charges, the balance is up from £183,514 to £290,217. The final dividend is declared at 10 (8) per cent. to make a total of 15 (12) per cent.

EXPERT TOOL GROUP, LIMITED (formerly the Expert Tool & Case Hardening Company, Limited)—At the annual meeting, the report of the directors was adopted and special resolutions changing the name of the company to the Expert Tool Group, Limited, and converting the unissued preference shares into ordinary shares were approved.

STAVELEY INDUSTRIES, LIMITED (formerly the Staveley Coal & Iron Company, Limited)—Group profits contracted to £1,385,404 (£1,675,843) and net profits to £601,659 (£832,970). Much of the reduction was due to higher research and development expenditure and to non-recurring losses. The dividend is held at 11 per cent., with a final of 8 per cent.

BRITISH ROLLMAKERS CORPORATION, LIMITED—Interim dividend is declared on the ordinary shares at 4 (3.2 equivalent) per cent. for the year ending December 30, 1961. The directors state that this should not be taken as indicating any intention to increase the total dividend for the year, but merely to bring the interim payment more into line with the total dividend.

HUGH WOOD & COMPANY, LIMITED, mining plant manufacturers, of London, E.C.2—With their declaration of a 5 per cent. interim on account of the year to October 31, 1961, the directors state that trading results to date have been satisfactory. It is expected that the final dividend will be not less than 9 per cent., making the total 14 per cent.—the same as the previous year's equivalent.

KEELAVITE HYDRAULICS, LIMITED—Further expansion is still necessary, states the chairman, Mr. G. V. Keeling, and plans for dealing with the problem will be laid before shareholders at an appropriate time. A substantial increase in production potential was not sufficient to satisfy the growing demand for the company's products. Order intake is running at a record figure. Group trading profits increased by 14½ per cent. to £131,427.

A. KING & SONS, scrap iron, steel, and metal merchants, of Great Yarmouth—The business is to be purchased by Metropole Industries, Limited, which is also to acquire the share capitals of the associated companies Elliott & Garrood, Limited, A. King & Sons (Export), Limited, and A. King & Sons (Steel Stockholders), Limited. The consideration will be the issue of 600,000 2s. shares plus £95,000 in cash. The deal is worth £420,000.

GEO. ANGUS & COMPANY, LIMITED, power transmission, fire, gear, and fluid sealing engineers, of Newcastle-upon-Tyne—While sales for the first eight months of 1961 show an increase over the corresponding period of 1960, overall profit margins are on a lower basis, the directors state. Results for the period are, in the circumstances, reasonably satisfactory and the board feels able to maintain the interim dividend at 7½ per cent. If no untoward conditions arise, it is hoped to maintain the dividend for the year.

INDIAN IRON & STEEL COMPANY, LIMITED—At the annual meeting in Calcutta, Sir Biren Mookerjee, the chairman, said the company, despite operational problems, had achieved a production of iron and steel amounting to about 90 per cent. of the rated capacity under normal working conditions in the year to March 3, 1961. He added that no steel expansion was currently under consideration, but might have to come later. There is a likelihood of another spunpipe scheme, details of which were expected in the near future.

A. A. JONES & SHIPMAN, LIMITED, engineers and machine-tool makers, of Leicester—Profits for the first half of the current year are in excess of the average monthly profits for the same period in 1960, and current intake of orders is still in excess of the monthly output, states Mr. F. G. Morris, chairman. He forecasts a final dividend of "at least" 15 per cent., if there are no untoward national or international events. This would make the 1961 total 20 per cent. on the doubled capital compared with the previous equivalent to 18¾ per cent.

TECALEMIT, LIMITED, lubrication, hydraulic and filtration engineers, of Feltham (Middx)—The directors announce the offering of the remaining 1,244,252 5s. ordinary shares at 13s. each to ordinary holders registered on September 18 to raise £808,000. One-for-four rights will require 1,188,937 for the provisional allotments. Excess share applications will be invited. The new shares will not rank for the final dividend of 12 per cent. which the directors expect to recommend on the present ordinary capital. An interim dividend of 6 per cent. has already been paid.

North-Eastern NCB Surveyor Retires

AFTER 53 years' continuous service in the coal industry, Mr. Clifford Beevers, divisional chief surveyor, North-Eastern Divisional Coal Board, retired last weekend. A presentation was made to him on Wednesday.

MR. C. BEEVERS

Mr. Beevers was born in Bolsover (Derbyshire), in 1893, and was educated at Staveley Grammar School. In 1908 he was articled to the late Sir J. P. Houfton, at that time general manager of the Bolsover Colliery Company, Limited, and in 1912 went to the company's Cresswell Colliery. The following year he was appointed surveyor at Brodsworth Colliery. He attended Sheffield University Mining and Mining Electricity courses and gained first-class certificates in both subjects.

With the formation in 1919 of the Doncaster Collieries Association Mr. Beevers was appointed chief surveyor of the group, and in 1934 he became chief surveyor and estates manager to Doncaster Almagamated Collieries, Limited, which had under its control six large pits. On vesting date he took up his present appointment. He is a member of the Mining Qualifications Board Panel of Examiners for Mine Surveyors' Certificates.

Before the inception of the Doncaster Area Drainage Act, 1929, he was interested in land drainage in mining and other areas and has continued that interest, playing a prominent part on both national and local levels. For his work in connection with land drainage, he was made MBE in 1959.

Future of Nottinghamshire Mining Education

FUTURE of fulltime mining education at the West Nottinghamshire Technical College, Mansfield, may be jeopardized as a result of a decision of the Ministry of Education. At a meeting of the Nottinghamshire Education Committee last week Ald. A. Thompson (chairman) protested at the Ministry's decision. The college had a high reputation for mining education and last year gained 100 per cent. of passes for national diplomas in mining—the highest percentage in the country, he said.

The policy of the committee, approved by the Regional Advisory Council, the NCB, and the miners, had, for a great number of years, been to centre mining education at Mansfield. Now the Ministry had decided that a three-year sandwich course leading to a national diploma in mining would be better held at the Nottingham and District Technical College.

The committee is to protest to the Ministry.

HUGHES BOLCKOW SHIPBREAKING COMPANY, LIMITED —Mr. James Bruce, director and general manager, has been appointed managing director.

Response to Appeal for Saturday Pit Working

SPEAKING at Brierley (Yorks) last week, Lord Robens, chairman of the National Coal Board, said that he was pleased at the response to the appeal for Saturday working at the pits. Referring to the future of the mining industry, he said that it had not yet started to use the vast scientific knowledge that the application of electronics and the use of remote control would bring. At about this time last year power loaded coal accounted for about 34 per cent. of all coal won. This year it was about 45 per cent. The aim was to reach 80 per cent., and also to increase the safety factor.

Lord Robens had opened a 1,000,000-gallon service reservoir for Hemsworth Joint Water Committee on the first day of a two-day visit to the North-Eastern Division of the NCB. Earlier he had visited the No. 4 (Carlton) Area headquarters, and toured Grimethorpe Colliery surface and Grimethorpe central power station, meeting management and local union officials of the Grimethorpe and Ferrymoor Collieries.

Last Friday Lord Robens, speaking at Scarborough to the annual conference of the National Association of Colliery Overmen, Deputies, and Shotfirers, again warned that the industry must ensure that there were ample supplies of domestic coal to meet a sharp spell in the weather during the coming winter.

As a long-term plan, he said, he wanted to carry 10,000,000 tons of varied stocks of coal, including large coal, which they could draw on like a bank when they needed it and which they could replace as required.

A different publicity campaign, just as big as this year's but with a new "slant," was planned for next year. The sales campaign had to be backed up by production. They had to shave down costs at the pits, and try to make those pits which were running at a loss as successful as those which made a profit.

The answer to the drift away of manpower was mechanization, which took the physical labour and drudgery out of the job and should improve safety. Electronic machinery could be operated from the safety of the roads.

Coal Industry May Have to Export More

IF some industries in Britain continued their present policy of using other fuels in place of coal, the coal industry would have no alternative but to seek oversea markets if it was to survive, Mr. L. Wormald, president of the Yorkshire Area of the National Association of Colliery Overmen, Deputies and Shotfirers, said at the union's conference at Scarborough last week.

Mr. Wormald said that his union was opposed to the Government's pay "pause." He added that the rapid transformation of coal faces to full mechanization called upon the under-official for a very high degree of supervision giving very little relaxation during a shift. The time had come to press for a shorter working shift for the deputy.

A MEMORIAL SERVICE for the late Mr. Guy Falla, chairman of Fergusson, Wild & Company, Limited, shipbrokers and ore merchants, of London, E.C.3, will be held on Wednesday at 11.30 a.m. at St. Helen's Church, Great St. Helen's, Bishopsgate, London, E.C.3.

NEWS IN BRIEF

A FELLOWSHIP IN MANAGEMENT STUDIES is to be established at Balliol College, Oxford. The endowment is being provided by the Institute of Directors.

ON October 25, at 1 p.m., the telephone number of the A.P.V. Company, Limited, and A.P.V.-Paramount, Limited, will be changed to Crawley 27777 when Crawley's telephone service becomes automatic.

ACTUAL PRODUCTION of raw steel in the US during the week ended October 2 totalled 2,131,000 net tons, according to the American Iron and Steel Institute. This was a 0.8 per cent. increase compared with the 2,114,000 tons produced in the preceding week.

WORLD LETTERS PATENT for the Mastiff 4-wheel drive tractor shovel principle, has been granted to Matbro, Limited, Horley (Surrey). Matbro invites applications for licence to build machines, utilizing the Mastiff patented principle, from reputable manufacturers, both in the UK and oversea.

SPECIALISTS in industrial hose and high pressure flexible pipes and fittings, Singlehurst Equipment, Limited, has acquired and now occupies the entire block of property of which it formerly rented a part at 211, Coventry Road, Small Heath, Birmingham 10. (Telephone: Victoria 1132).

THE FIRST CARGO of steel to be shipped from the Hartlepools has left the port for France in the Dutch ship Jupiter. The vessel carried a consignment of steel plates manufactured by the South Durham Steel & Iron Company, Limited. In the past, the firm's products have been shipped from the River Tees.

START OF WORK on three important new research buildings at the National Physical Laboratory, Teddington, was formally inaugurated on Monday by Mr. Richard Thompson, Parliamentary Secretary to the Ministry of Works. The three schemes will cost about £1,000,000, and are for the basic physics, autonomics, and metallurgy divisions.

OPENSHAW WORKS of B. & S. Massey, Limited, makers of forging and dropforging plant, was visited last week by a delegation from the Japanese Drop Forging Industry. The 18-man party, led by Mr. Minekichi Kato, were on a two-day visit to this country to study at first hand equipment available to the dropforging industry.

AN EXTENSIVE modernization and expansion programme has been completed by Moon Bros., Limited, steel drum plant manufacturers, of Birkenhead (Ches). Added capacity, which should lead to an increase of 20 per cent. in the labour force, is designed to reduce the rather extended deliveries that the company has had to give in the past.

COAL AND COKE SHIPMENTS from the Tyne in the first eight months of this year totalled 4,006,690 tons, an increase of 350,338 tons, compared with the corresponding period of 1960. Coastwise cargoes at 3,432,394 tons rose by 318,138 tons and export shipments by 35,439 tons to 548,989 tons. Bunker shipments, however, fell by 3,239 tons to 25,307 tons.

ELECTRICITY was exchanged between Britain and France for the first time on Wednesday through the recently completed Channel power cable. The initial test involved the transfer of power for a short period in each direction, which was fed into the national transmission networks. After further tests, the cable is expected to be working commercially before the end of the year.

COMPLETED questionnaires carrying the views of supervisors throughout the country on selection and training methods, prepared and sent out by the Institute of Industrial Supervisors and a London School of Economics research team, are to be submitted after collation and analysis to the Minister of Labour's Committee of Inquiry into the Selection and Training of Supervisors.

FIRST ANNUAL sales conference of Fafnir Bearing Company, Limited, was held at Wolverhampton last Friday and Saturday. The conference was attended by Mr. K. T. Middleton, president, and Mr. W. L. Hubbard, director of oversea developments; directors of the parent concern, the Fafnir Bearing Company, of New Britain, USA; and directors of the Wolverhampton concern.

THE NEW CANADIAN COMPANY of Metal Industries, Limited, is to begin operations on November 1. Known as Dominion M.I., Limited, it will be concerned with the promotion of MI group products in the Canadian market and with the manufacture of specialized electrical control systems. President and general manager will be Mr. E. A. Chandler, and general sales manager, Mr. D. J. Tamblyn.

NEW £500,000 basic slag works of Scottish Agricultural Industries, Limited, which was opened at Scunthorpe (Lincs) on Tuesday, will draw its raw materials from the new Rotor oxygen process furnace recently commissioned at the Redbourne Works of Richard Thomas & Baldwins, Limited. It is adjacent to the steelworks and is designed to produce 120,000 tons of basic slag per year.

EXCLUSIVE LICENCE has been granted by the Plessey Company, Limited, to the Centralab division of Globe Union, Inc., USA, to manufacture, sell and use in the US moulded track potentiometers made to Plessey designs. The American concern has also been granted a non-exclusive licence to make, use and sell these potentiometers in Canada, and Central and South America. Initial period of the agreements is 10 years.

AN UNUSUAL EXHIBITION was held at the Durham Road, Birtley, premises of Marsh Plant Services, Limited, from September 26 to 29, when this company devoted the whole of its indoor and outdoor show space to a display of the products of one of the manufacturers for whom it acts as agent. The manufacturer was Atlas Copco (Great Britain), Limited, of Hemel Hempstead (Herts), and the items on view ranged from mine loaders to small pneumatic tools.

AS PART OF its industrial products division decentralization programme, the Goodyear Tyre & Rubber Co. (Gt. Britain), Limited, has opened a new sales office at 24, Broughton Street, Manchester, 8 (telephone Deansgate 7921). The new office is under the direction of Mr. L. G. Millington, Northern Division manager (industrial products) and Mr. J. L. Harris has been transferred from the company's headquarters in Wolverhampton to control the sales office operation.

FOLLOWING THE FORMATION of the Crane Fruehauf Trailer Company, Limited, North Walsham, in May, it was forecast that the new plant would be operative and producing semi-trailers early next year. It is now anticipated that production on standard Crane 8-18 ton semi-trailers will be transferred from the South Green Works of Cranes (Dereham), Limited, gradually from January, 1962, onwards. This is the first stage of a phased production programme, leading eventually to the full introduction and incorporation, where practicable for the UK market, of Fruehauf designs from the USA into Crane assemblies.

Orders Placed

Scottish Ropes for Finland

DESPITE competition from several European countries an order "worth many thousands of pounds" for wire rope outfits for seven Swedish ships being built in Finland has been received by Martin, Black & Company (Wire Ropes), Limited, Coatbridge, Scotland. A spokesman of the company said that the order was only one of several that had been received from Finland in recent years. Sweden was also a customer, particularly for large-diameter high-strength wire ropes for earth moving.

The order followed a three-day flying visit to Finland made by Mr. George A. Black, export director. He is leaving this week on a six-week "personal contact tour" of Canada and the US.

OVERALL CONTRACT for engineering and construction of its titanium oxide plant to be built at Bunbury, Western Australia, has been awarded by the Bechtel Organization, Limited, to Laporte Titanium, Limited.

ORDERS HAVE BEEN received by Perkins Gas Turbines, Limited, Peterborough (Northants), from three universities in Ghent, Colombo, and Hong Kong, for 50 h.p. Mars gas turbine sets, one of the smallest of such turbines in production.

TWO SETS of support plates for the nuclear reactor of the new Dungeness power station are to be supplied by the Yorkshire Engine Company, Limited, Sheffield. The order is worth £75,000. The company has supplied similar plates to the Hunterston reactor.

ORDER for an ore carrier worth £1,000,000 has been placed at the Sunderland shipyard of Austin & Pickersgill, Limited, by the West Wales Steamship Company, Limited, Newport (Mon). It is the 18th contract on the River Wear this year, bringing the total value to £22,000,000.

CONTRACTS WORTH £14,000,000 for two more County Class guided missile destroyers have been awarded by the Admiralty, one to Vickers-Armstrongs (Shipbuilders), Limited, Newcastle-upon-Tyne, and the other to Fairfield Shipbuilding & Engineering Company, Limited, Govan, Glasgow.

CONTRACTS TOTALLING over £617,000 have been placed by the North Eastern Region of British Railways with the Westinghouse Brake & Signal Company, Limited. They cover the main technical equipment for the new mechanized marshalling yard at Healey Mills, near Wakefield (Yorks).

SHEPPARD & SONS, LIMITED, heavy precision and general engineers, of Bridgend (Glam), have received four export orders totalling £60,000 for ingot casting machines during the past week. They are for shipment to the Israeli Steel Mills, Stanton Iron Works (Australia), Limited, Halivour Giki, of Athens, and Norddeutsche Affinerie.

MAKERS OF elevating, conveying, and conditioning plant, Spencer (Melksham), Limited, has recently been awarded three important contracts totalling about £900,000. They are for plant and equipment for the Port of Bristol Authority (£600,000), mechanical equipment for the GPO (just under £200,000), and pneumatic grain handling plants for shipment to China by M. D. Ewart & Company, Limited (£100,000).

SIX FARMS totalling 263 acres and comprising a quarter of the estate owned by the Butterley Company, Limited, structural and general engineers, of Derby, were sold for a total of £16,500 at a Derby auction last Friday.

Free Competition Between Fuels for Heating Urged

CLAIMING that the heating industry was handicapped by the present national fuel policy, Dr. Frank M. H. Taylor, president of the British Institution of Heating and Ventilating Engineers, urged last week that "the artificial insulation of monopolistic fuel suppliers from the blasts of competition from alternative fuels, whether produced at home or imported, should be reviewed and eventually terminated."

Dr. Taylor, who was speaking at the opening session of the first International Heating, Ventilating, and Air Conditioning Conference at Olympia, London, said that the work heating engineers did today provided a "captive customer" for one or other of the fuel suppliers for at least the next 10 years." Sudden alterations in fuel and equipment prices caused by taxation changes should be avoided, as this caused a distortion of the economics of an installation and prevented the long-term planning of the design and production of equipment.

He added that the time when Britain tended to lag behind other countries in the design of heating equipment because here fuel prices were lower had gone. Industrial gas in Britain now cost 15.75d. a therm, whereas in the US it was 2d. to 3d. a therm, and coal in the UK for industrial use cost 103s. a ton compared with 70s. a ton on the Eastern seaboard of America.

Urging at least an equal expenditure on research and development in heating and ventilating to that of other technologies, Dr. Taylor said there was abundant evidence that present expenditure fell far short of the nation's average, and should be increased several times over the next five years.

Power-Gas Contract for New Magnesium Plant

THE Power-Gas Corporation, Limited, Stockton-on-Tees, a member of the Davy-Ashmore, Limited, group, has been appointed main contractors by Magnesium Elektron, Limited, for the engineering of a new plant to produce 5,000 tons per annum of magnesium at Hopton, near Wirksworth (Derbyshire). The completion of the Hopton project will make the UK largely independent of imports from oversea of this strategically important light metal.

The plant will extract magnesium of 99.9 per cent. purity from local dolomite by a reduction process which has not previously been operated on a commercial scale in this country. The total value of the completed plant to Magnesium Elektron is expected to be in the region of £2,000,000.

This is a further development of the activity of Power-Gas Corporation in the field of non-ferrous metallurgical plant.

NEW SUBSIDIARY, Sparcatron (Manufacturing), Limited, has been formed by the Universal Grinding Wheel Company, Limited. The subsidiary has taken over a new factory at Tuffley Crescent, Gloucester, designed for the manufacture of Sparcatron machines previously made by another subsidiary, Impregnated Diamond Products, Limited.

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Imports and Exports of Iron and Steel

FIGURES of imports and exports of iron and steel in August are given in the following tables, based on the Board of Trade returns, and including totals for the first eight months of 1960 and 1961.

Total Exports of Iron and Steel

Destination.	Month ended Aug. 31.	Eight months ended August 31.	
	1961.	1960.	1961.
	Tons.	Tons.	Tons.
Malta	211	4,216	3,459
Sierra Leone	737	3,512	7,184
Ghana	1,248	14,650	11,653
Nigeria	8,263	40,629	50,312
Union of South Africa	3,322	48,768	42,388
South-West Africa	1,935	5,020	11,351
Rhodesia and Nyasaland	1,532	18,240	21,680
Tanganyika	2,053	9,683	19,520
Kenya	2,234	20,027	27,817
Uganda	121	898	1,815
Mauritius	104	2,960	1,446
Bahrein, Qatar, and Trucial States	1,065	9,788	13,709
Kuwait	5,486	4,874	16,872
India	16,378	184,665	138,892
Pakistan	6,942	47,757	62,077
Singapore	1,703	12,967	17,746
Malaya	3,106	12,697	18,776
Ceylon	1,467	37,716	27,517
British North Borneo	777	3,292	2,112
Hongkong	8,969	58,233	58,787
Australia	4,786	117,362	92,555
New Zealand	9,018	75,096	166,236
Canada	7,435	155,724	87,501
Jamaica	978	15,445	11,042
Trinidad	3,199	28,159	30,384
British Guiana	720	6,219	6,429
Other Commonwealth countries	2,733	18,160	20,742
Eire	6,251	40,554	51,161
Soviet Union	10,156	22,917	23,918
Finland	5,117	32,537	41,092
Sweden	11,871	117,378	112,118
Norway	10,971	76,636	90,729
Denmark	9,578	65,928	70,146
Poland	11,337	7,155	28,915
Western Germany	10,135	97,393	75,889
Eastern Germany	1,535	15,087	17,467
Netherlands	5,963	82,944	84,114
Belgium	5,210	24,233	23,133
France	1,139	4,959	8,882
Switzerland	1,855	8,840	15,313
Portugal	1,703	10,525	17,725
Spain	2,643	35,742	16,788
Italy	8,184	28,734	48,765
Austria	468	3,361	3,664
Yugoslavia	1,015	28,339	20,926
Greece	2,417	12,566	24,635
Turkey	669	9,657	11,609
Netherlands Antilles	195	2,694	1,257
Portuguese East Africa	180	3,206	1,806
Egypt	1,707	9,570	22,185
Libya	7,672	29,847	13,458
Sudan	653	6,712	6,800
Israel	2,212	13,931	16,198
Saudi Arabia	170	345	992
Iraq	1,371	28,074	25,174
Iran	3,868	46,683	24,076
Burma	253	4,596	3,565
Thailand	544	3,794	3,991
Indonesia	76	18,190	2,735
China	314	37,457	10,411
Japan	10,046	49,698	114,588
Philippine Republic	588	5,861	3,440
USA	10,763	156,593	86,528
Cuba	—	5,840	801
Mexico	386	4,746	2,835
Colombia	755	6,151	8,149
Venezuela	2,518	26,463	19,771
Ecuador	354	2,054	2,118
Peru	977	4,526	6,117
Chile	163	3,144	2,350
Brazil	1,536	21,829	13,121
Uruguay	1,040	6,031	6,314
Argentina	11,215	59,349	116,304
Other foreign countries	4,568	40,288	49,162
TOTAL	268,863	2,270,914	2,321,237

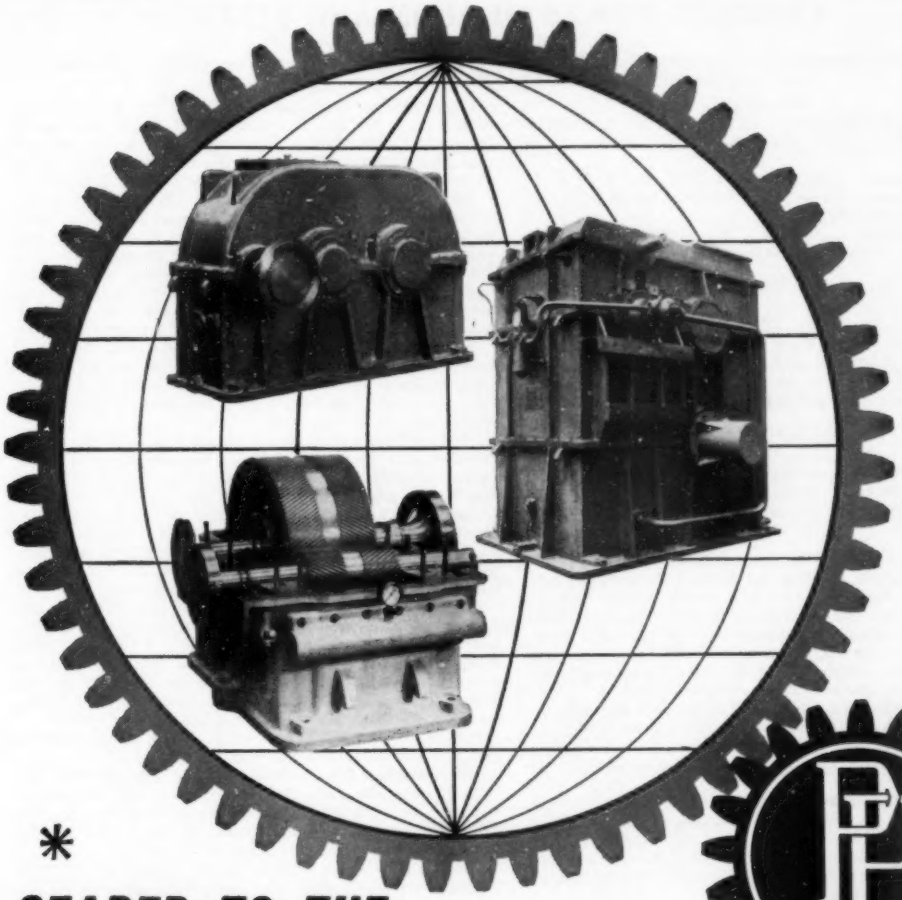
Total Imports of Iron and Steel

From	Month ended August 31.	Eight months ended August 31.	
	1961.	1960.	1961.
	Tons.	Tons.	Tons.
Union of South Africa	4,282	22,954	26,291
Rhodesia and Nyasaland	844	4,855	18,394
Canada	3,130	147,891	67,165
Other Commonwealth countries and Eire	460	30,609	33,927
Soviet Union	7,197	26,327	17,111
Sweden	2,902	31,378	32,967
Norway	6,934	106,068	76,619
Poland	—	8,261	652
Western Germany	1,170	101,271	18,143
Netherlands	7,815	141,288	77,313
Belgium	950	82,462	24,577
Luxembourg	—	10,864	10,130
France	2,028	49,654	14,455
Italy	163	21,028	466
Austria	516	9,298	3,784
Japan	372	4,495	4,774
USA	1,013	296,397	9,355
Other foreign countries	1,178	90,921	8,705
TOTAL	40,954	1,186,021	444,828
Iron and steel scrap and waste fit only for the recovery of metal	4,182	154,817	16,882

Exports of Iron and Steel, by Product

Product.	Month ended Aug. 31.	Eight months ended August 31.	
	1961.	1960.	1961.
	Tons.	Tons.	Tons.
Pig-iron	19,031	111,825	80,525
Ferro-columbium (niobium)	6	78	57
Ferro-tungsten	147	638	804
Other ferro-alloys	340	6,384	2,589
Ingots, blooms, billets, slabs, sheet bars (incl. tinplate bars) and similar primary forms	7,765	21,267	78,211
Pieces roughly shaped by forging	210	720	1,520
Iron bars, rods, angles, shapes, and sections	106	1,175	1,467
Steel bars, rods, angles, sections, and shapes	46,065	423,240	459,974
Iron plates and sheets	—	527	376
Universal plates	890	13,375	10,593
Steel plate, 3 mm. and under 4.5 mm. thickness	3,782	28,034	27,106
Ditto, 4.5 mm. or more in thickness	19,173	232,584	232,523
Blacksheets and blackplate	41,954	199,829	267,231
Hoop and strip	6,046	67,840	78,382
Tinplate	31,861	346,577	295,022
Decorated tinplate	718	3,562	4,675
Galvanized sheets	3,757	55,013	47,051
Other (incl. tinned sheets, terneplate, and ternesheets)	3,068	17,830	27,648
Railway and tramway construction material	14,649	115,985	138,819
Wire rods of steel (incl. alloy steel)	5,126	37,611	43,024
Wire	9,210	80,274	90,960
Tubes, pipes, and fittings	54,959	506,556	432,680
TOTAL	268,863	2,270,914	2,321,237

LICENCE to manufacture and market in the UK the products of Pacific Pumps, a division of Dresser Industries, of Los Angeles, California, is being taken up by G. & J. Weir, Limited, Glasgow. Selling arrangements for Weir-Pacific pumps will be handled by existing staff at the branch offices and at the Weir headquarters at Cathcart, but in the London area Mr. Gavin R. Murison, formerly manager of the Weir Birmingham office, will take over Weir-Pacific sales from the Weir office at 37, Mincing Lane, E.C.3.



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CURRENT PRICES OF IRON AND STEEL

October 5, 1961

(Basic prices, delivered unless otherwise stated. Prices following side headings marked * are subject to an increase of 1 per cent. under Iron and Steel Board Price Determination, 1961, No. 2)

PIG-IRON

***Foundry and Forge Iron.**—No. 3 iron, Class 2, Middlesbrough, £21 17s.; Birmingham, £21 9s. 3d., 10-ton lots or over.

***Low-phosphorus Iron.**—Over 0·10% to 0·40% P, 10-ton lots or over, £23 5s., delivered Birmingham, £23 10s., delivered Grangemouth.

***Basic Pig-iron.**—Delivered in Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leics, 10-ton lots or over, £20 3s.

***Hematite.**—Si less than 2%, S & P 0·03-0·05%, 10-ton lots or over: N.-E. (local iron), £23 19s.; Scotland (Scotch iron), Zone S.1, £24 5s. 6d.; Sheffield, £25 9s.; Birmingham, £25 13s.; South Wales (Welsh iron), £23 19s.

Refined.—Cylinder and refined irons, South Zone, £25 9s., North Zone, £25 6s. 6d. Refined malleable, max. 0·10% P, South Zone £26 9s., North Zone £26 6s. 6d.

MANUFACTURED IRON

(*Bar basis, 2½ in. to ¾ in.*)

CROWN IRON: England and Wales (Zone 1), £51 12s. 6d.; Scotland, £51 7s. 6d.; Ireland, f.o.q. Belfast, £54 12s. 6d., all other Northern Ireland ports, £55 12s. 6d., f.o.q. Cable iron, £1 extra.

SEMI-FINISHED STEEL

***Re-rolling Billets, Blooms, and Slabs.**—BASIC: Soft, u.t., 100 tons and over, £31 15s. 6d.; tested, 0·08-0·33% C, 100 tons and over, £32 5s. 6d.; hard (0·41-0·60% C), 50 tons and over, £33 17s.; silico-manganese, 50 tons and over, £42 16s. 6d.; free-cutting steel up to 0·25% C, 50 tons and over, £35 4s. 6d. SIEMENS-MARTIN ACID (50 tons and over): Up to 0·25% C, £40 11s.; silico-manganese, £43 4s.

***Billets, Blooms, and Slabs for Forging and Stamping.**—Lots of 50 tons and over. Basic, soft, up to 0·33% C, £37; basic, hard, over 0·41 up to 0·60% C, £38 2s. 6d.; acid, up to 0·25% C, £41 14s.; acid silico-manganese, £44 17s.

Alloy Steel (25 tons and over).—BILLETS, 3 in., up to and including 10 in., for re-rolling, 0·6/1% Ni, £47 3s., Ni 2·75/3·75%, Cr 0·5/1·10%, £76 5s.; Ni 2·75/3·75%, Cr 0·5/1·3%, Mo. 0·2/0·65% £86 14s. BARS: 1 in. dia. and up, nickel, £67 16s.; nickel-chrome, £100 18s.; nickel-chrome-molybdenum, £113 11s.

***Other Semi-products,etc.**—Forging ingots, up to 0·60% C, £32 (gross) f.o.t.; tube billets, 50 tons and over, £39 10s.; shell steel billets for direct forging, up to and including 0·33% C, 100 tons and over, £37 15s.; tin bars and sheet bars, 50 tons and over, £32 10s. Wire rods, 3g. to 4g. (all areas except Birmingham, Scotland, Southern Joint Area, and Northern Ireland). 50 tons and over: Soft basic, £39 17s.; hard basic, £43 8s; free-cutting, up to 0·25% C, £45; acid, up to 0·75% C, £54 6s. 6d. Stainless steel billets, 3 in. and larger, 10 tons and over, Austenitic, £228 10s.; martensitic, £133.

FINISHED STEEL

***Heavy Products** (50 tons and over).—Mild-steel plates, ordinary qualities, N.-E. Coast and Northern Joint Areas and Central Scotland, £40 7s.; medium plates, all areas of England and Wales, £43 16s. 6d.; boiler plates, N.-E. Coast and Northern Joint Areas and Central Scotland, £42 17s.; floor plates, N.-E. Coast, £41 16s. Sections (N.-E. Coast, Midland and Northern Joint Areas, and Central Scotland): Angles, £38 1s. 6d.; bars (rounds and squares), £40 11s. 6d.; flats, £38 6s. 6d.; joists, £37 17s. 6d.

***Rolled and Re-rolled Steel Products.**—N.-E. Coast, Midland, Northern Joint and South Wales Areas, and Central Scotland, 50 tons and over: Angles and tees, 4 united in. and under, £40 18s. Channels, 3-in. web and under, £40 18s. Flats, 5 in. wide and under, and rounds and squares, under 3 in.: Untested soft basic, £39 1s.; free-cutting, £44 9s. 6d.; hard basic, £41 19s. 6d.; Siemens-Martin acid, £49 12s. 6d.; spring steel, basic, £44 4s. 6d. spring steel, acid, £53 11s. Glazing tees, £47 0s. 6d. Sash and casement sections, £43 13s. 6d. Gate channels, £50 17s. 6d. Ferro-concrete bars (10 tons to under 500 tons), £39 10s.

***Sheets and Strip.**—Uncoated strip mill coils, hot rolled, under 3 mm. to 12g., mill run, mill edge, 25 tons to under 50 tons, £43 16s.; cold reduced, 17/20g., side trimmed, skin passed, £49 16s. Black sheets, 24g., 10 tons and over, £57 14s. 6d.; galvanized corrugated sheets, 24g., 10 tons and over, £66 17s. Cold-rolled steel strip, coils, hard temper, not annealed, 20 tons and over, £54 5s. Hot-rolled hoop and strip, u/t soft basic, 100 tons and over, £38.

***Tinplates and Blackplate.**—Cold reduced, hot dipped, 15 tons to under 50 tons, 67s. 1d. per basis box of 108 lb., f.o.t. maker's works. Cold reduced electrolytic tinplate, 59s. 10d. per basis box, f.o.t. Cold reduced blackplate, 57s. 2d. per basis box, f.o.t.

***Colliery Rails and Arches.**—Arches, 4 in. × 2½ in. × 2 in., re-rolled, £38 15s.; 3 in. × 3 in., re-rolled, £39; 3½ in. × 3½ in., re-rolled, £40 7s. 6d.; 4 in. × 2½ in. × 2 in., prime £43 7s. 6d. Other sections, prime, £43 12s. 6d. Extra fish-plates, £52 10s. Cambered girders, 4 in. × 2½ in. × 2 in., re-rolled, £37 9s.; 3 in. × 3 in., re-rolled, £37 11s. 6d.; 3½ in. × 3½ in., re-rolled, £38 18s. 6d.; 4 in. × 2½ in. × 2 in., prime. £42 4s. 6d. Other sections, prime, £42 7s. Benk bars; standard type, prime material, all thicknesses, £38 11s, "W" type bars, prime steel, all thicknesses, £41 1s. Standard type, re-rolled, up to ½ in., inclusive, £36 3s. 6d., over ½ in. to ½ in., inclusive, £37 8s. 9d. "W" type bars, re-rolled, up to ½ in., inclusive, £38 13s. 6d.; over ½ in. to ½ in., inclusive, £39 18s. 6d. Light rails, flange, 25 lb. and under, prime, £40 17s. 6d. Flange rails, 25 lb. and under, re-rolled, £39 15s. Fishplates, £50 12s. 6d.

***Bright Steel** (50 tons and over).—Bars, no analysis or test, £53 5s.; flats, untested, £70 16s. 6d.

High-speed Tool Steel.—Finished bars, 5% cobalt, 10s. 10d.; 14% tungsten, 6s. 11d.; 18% tungsten, 7s. 9d.; 22% tungsten, 9s. 2d.; 4/6 quality molybdenum tungsten, 6s. 3d.; 6/6 quality molybdenum tungsten, 6s. 5d.; 5/6/2 quality molybdenum tungsten vanadium, 6s. 7d. per lb.

***Rails, etc.**—F.B. rails, 75 lb. to under 90 lb., 500 tons and over, f.o.t., £39 15s. Light flange rails, 25 lb. and under, d/d N.-E. Coast, Midland, Northern Joint and South Wales Areas, and Central Scotland, 50 tons and over, £40 17s. 6d.

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	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Heavy steel scrap*	229 3	228 3	220 0	226 3	226 3	227 3	232 3
Heavy mixed scrap*	207 3	206 3	198 6	204 3	203 9	205 3	210 3
Heavy steel turnings† ..	179 9	179 9	169 9	176 9	174 3	177 0	180 0
Heavy cast iron†	206 9	203 9	208 0	204 3	189 3	199 3	205 9
Cast-iron borings†	160 3	157 3	157 0	159 9	157 3	159 6	164 6

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2nd October, 1961.

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COMPANY NOTICE

SIR DONALD PERROTT, K.B.E., has been elected to the Board of Cammell Laird & Company, Limited.

Due to pressure of other business interests, Mr. P. B. Hunter has relinquished the Chairmanship of The Patent Shaft Steel Works, Limited, and this position has now been assumed by Sir Donald Perrott.

Mr. P. B. Hunter remains on the Board of the Patent Shaft Steel Works, Limited.

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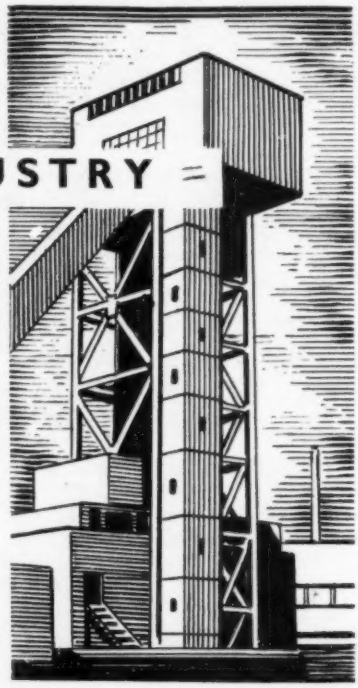

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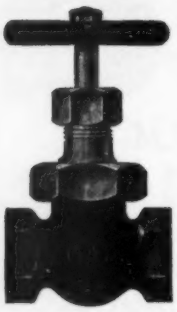

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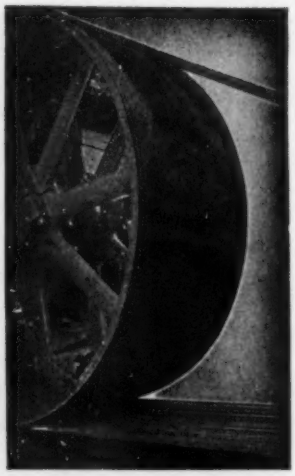

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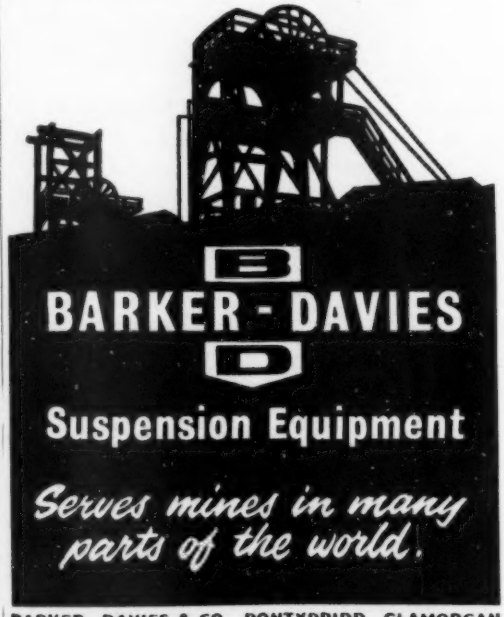

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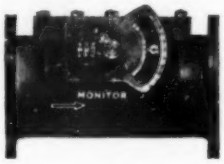

Fig. 1.

Fig. 2.

Fig 3.

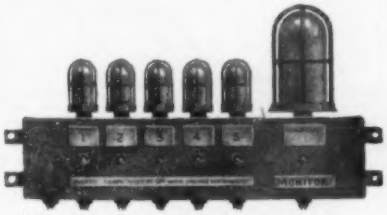

Fig. 4.

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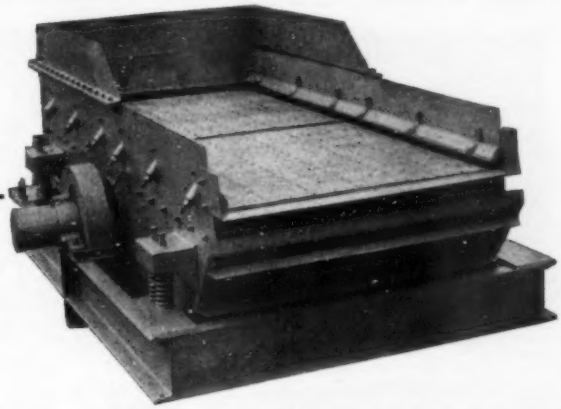

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